

Ekonomski horizonti



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UVODNIK

Sveska 3 Volumen 26 Godište 24 naučnog časopisa *Ekonomski horizonti*, nakon sprovedenog dvostruko anonimnog recenzentskog postupka, sadrži pet izvornih naučnih članaka, jedan pregledni članak i Pregled autora i naslova svih priloga publikovanih u Časopisu u 2024.

Koautori *Sasho Arsov* i *Aleksandar Naumoski* istražuju uticaj različitih faktora na nivo stranih direktnih investicija, sa posebnim naglaskom na neekonomske, uglavnom institucionalne determinante. Korišćenjem širokog uzorka od 124 zemlje i podataka za period 1996-2019, koautori primenjuju dinamičku panel GMM regresiju. Rezultati ukazuju da relativni udeo stranih direktnih investicija u BDP-u pozitivno zavisi od razvoja institucija u zemlji. Da bi privukle strane investitore, zemlje domaćini treba da naprave značajan napredak u funkcionisanju pravnog sistema, efikasnosti vlade i borbi protiv korupcije, kao i da stvore povoljan investicioni ambijent. Primena istog regresionog modela na poduzorak evropskih zemalja potvrdila je navedene nalaze, ukazujući donosiocima odluka da moraju preduzeti korake ka otklanjanju sistemskih nedostataka, umesto da subvencionišu strane investitore.

Polazeći od činjenice da je proces brze liberalizacije ubrzao prelaz bivših socijalističkih privreda na privrede zasnovane na slobodnom tržištu, koautori *Olcaj Çolak* i *Ömer Faruk Bölükbashi* ističu da su se mnoge prikrivene političke tenzije među nekim zemljama takođe pretočile u sukobe i ratove. Iz tog razloga, zemlje opredeljuju svoje oskudne resurse za potrebe nacionalne bezbednosti, pre nego za svoje razvojne ciljeve, postepeno povećavajući svoja

izdvajanja za potrebe finansiranja odbrane. U skladu s tim, koautori ispituju postojanje dinamične veze izdvajanja za finansiranje odbrane i nezaposlenosti tokom perioda 1996-2021. u odabраниh devet zemalja bivših sovjetskih republika koje su nastale nakon kraha Sovjetskog Saveza. Rezultati studije ukazuju da izdvajanja za finansiranje odbrane kratkoročno ne utiču na nezaposlenost i imaju pozitivan učinak u dugom roku.

Istražujući uticaj finansijske tehnologije (Fintek) na stopu inflacije, koautori *Muhammad Syariful Anam*, *M. Silahul Mu'min* i *Nafis Dwi Kartiko* kreiraju novi indeks za Fintek, koji u sebi sadrži nekoliko pokazatelja koji koriste analizu glavnih komponenata. Podaci koji se u radu koriste su podaci iz skupa panel podataka koji se odnose na 10 pokrajina ostrva Sumatra, Indonezija, u vremenskom periodu od januara 2020. do juna 2023. godine. Metoda za procenu sakupljene srednje grupe (PMG) je primenjena za testiranje odnosa između Finteka i stope inflacije. Rezultati istraživanja ukazuju da Fintek utiče na smanjenje inflacije u dugom roku. Na osnovu toga, ističe se neophodnost intenziviranja korišćenja Finteka u stvaranju efikasnog ekonomskog okruženja i promovisanju ekonomske stabilnosti.

Koautori *Srdan Marinković*, *Ognjen Radović* i *Jelena Radojičić* razmatraju trendove i analiziraju pravilnosti koje se pojavljuju na nacionalnom tržištu stanova u Republici Srbiji i na njenim regionalnim tržištima. Polazna pretpostavka je da se, pored zajedničkih tržišnih sila, tržište novoizgrađenih stanova i tržište postojećeg stambenog fonda ponašaju kao dva izdvojena segmenta tržišta stanova sa nepotpunim prilagođavanjem cena. U fokusu analize je udaljavanje cena na ova dva segmenta, sa posebnim interesom za proces uzajamnog prilagođavanja. Koautori primenjuju *Granger*-ove testove uzročnosti da bi

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otkrili da li postoji uzročna zavisnost u indeksima cena na ova dva tržišna segmenta. Rezultati analize ukazuju da slučaj uzročnosti od tržišta postojećeg stambenog fonda ka tržištu novoizgrađenih stanova prevladava među regionalnim tržištima. Ista metodologija je primenjena u analizi uzročnosti između regionalnih tržišta, potvrđujući verovatan uticaj beogradskog tržišta novoizgrađenih stanova na tržišta u ostalim regionima.

Shodno stavu da je predviđanje finansijskih teškoća u kompanijama važno usled kompleksnosti i dinamičnosti savremenog poslovnog okruženja, koautori *Dragomir Dimitrijević*, *Sunčica Milutinović* i *Predrag Stanković* ukazuju na značaj identifikovanja potencijalnih finansijskih poteškoća koje mogu rezultirati stečajem. U radu se istražuju ključne determinante nastupanja finansijskih neprilika koje mogu dovesti do stečaja kompanija. Cilj istraživanja je utvrđivanje međuzavisnosti pojedinih determinanti nastupanja finansijskih neprilika i pokazatelja verovatnoće nastupanja finansijskih neprilika, kao i ustanoviti razlike u verovatnoći nastupanja finansijskih neprilika, pre i nakon pojave pandemije izazvane virusom COVID-19 u Republici Srbiji. Rezultati istraživanja ukazuju da postoji statistički značajna negativna korelacija determinanti profitabilnosti, likvidnosti i solventnosti i verovatnoće nastupanja finansijskih neprilika. Takođe, istraživanje pokazuje da postoji statistički značajna pozitivna korelacija leveridža i verovatnoće nastupanja finansijskih neprilika, kao i rasta kompanije i pokazatelja *Altman*-ovog *Z-score*-a. Pored navedenog, postoji i statistički značajna razlika u vrednosti pokazatelja *Altman*-ovog *Z-score*-a, pre i nakon pojave pandemije izazvane virusom COVID-19.

Dopunjujući koncept korporativnog preduzetništva doprinosima koje nude modeli planiranih organizacionih promena, autor *Nebojša Janićijević* analizira proces promena putem kojeg se realizuju preduzetnički poduhvati pojedinaca i grupa unutar organizacija. Nakon predstavljanja koncepta korporativnog preduzetništva, izvršena je sinteza doprinosa najviše citiranih modela planiranih organizacionih promena kojim su definisane aktivnosti ili koraci koje interni preduzetnik, kao agent promena, treba da preduzme kako bi realizovao projekat korporativnog preduzetništva. Primenom Levinovog modela (odmrzavanje-pokret-ponovno zamrzavanje) identifikovane su sledeće aktivnosti: kreiranje svesti o neophodnosti promena, kreiranje i komuniciranje vizije, priprema promena, implementiranje promena, olakšavanje promena, institucionalizacija i monitoring promena. Time se koncept korporativnog preduzetništva dopunjuje i čini realnijim u praksi.

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Glavni i odgovorni urednik
Milena Jakšić

Milena Jakšić je redovni profesor na Ekonomskom fakultetu Univerziteta u Kragujevcu. Doktorirala je na Ekonomskom fakultetu Univerziteta u Kragujevcu, iz uže naučne oblasti Opšta ekonomija i privredni razvoj. Ključne oblasti njenog naučnoistraživačkog interesovanja su finansijski sistem, finansijska tržišta, finansijski instrumenti i finansijske institucije.

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THE NEXUS BETWEEN INSTITUTIONAL DEVELOPMENT AND FOREIGN INVESTORS' PREFERENCES - A COMPREHENSIVE GMM STUDY

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This paper investigates the impact of various factors on the level of foreign direct investments in a country, with a special emphasis on the noneconomic, mostly institutional determinants. Using a broad sample of 124 countries and data for the period from 1996 to 2019, a dynamic panel GMM regression is applied. The regression results indicate that the relative share of FDI in the GDP depends positively on the development of the institutions in the country. To attract foreign investors, host countries should make considerable progress in the functioning of their legal system, the effectiveness of the government and fight against corruption, as well as creating an overall favorable investment climate. The same regression model applied to a subsample of European countries reinforced these findings, sending an important message to policymakers, who need to make decisive steps towards fixing systematic deficiencies rather than subsidizing foreign investors, which is a practice with suspicious cost-effectiveness at the macro level.

Keywords: foreign direct investments, institutions, corruption, rule of law

JEL Classification: F21, O43, P48

INTRODUCTION

The phenomenon of foreign direct investment (FDI) gained increased attention over the last decades of the 20th century as they began to be perceived as a valuable source of investable funds and a shortcut to intensified economic growth. This process was additionally bolstered by the collapse of socialism and

the ensuing process of economic transition, in which billions-of-dollars' worth of state-owned capital assets was offered for sale to private investors. The cross-border movement of capital was subsequently encouraged by some international organizations, such as UNCTAD, the OECD, etc., which extensively emphasized the benefits for the recipient countries. The popularization of FDI attracted the attention of economic science, which found the effects and determinants of FDI compelling grounds for research and examination.

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According to the literature at the time, FDI was expected to bring a host of economic benefits to the recipient countries (De Jager, 2004; Hansen & Rand, 2006). Although some recent studies have failed to unambiguously confirm these postulates, the hunger for investible funds resulted in a worldwide contest aimed at providing better opportunities for foreign investors, be it in the form of relaxed domestic regulations or in the form of bilateral and multilateral agreements aimed at reducing the barriers for capital inflows from abroad (Dašić, 2011; UNCTAD, 2022).

The general purpose of all these measures was to overcome the competitive weaknesses of certain countries in comparison to their peers. Economies differ in many respects, such as natural (geography, resources, climate, access to the sea, etc.), and in their social and economic characteristics as well, predominantly determined by the actions of the past and current generations. Researchers found it important to explore if there were any determinants of FDI that dominated the decision-making process of the foreign investors. This knowledge could provide governments with at least two pieces of information needed to model their policies: the extent to which they should strive in order to make improvements so as to successfully compete with other countries in attracting FDI, and also to determine the areas in which they should concentrate their efforts.

As foreign investors naturally search for ways to increase their economic efficiency and profitability, the most obvious candidates to be considered determinants of FDI are those that could, in one way or another, contribute to the mentioned objective. This favors countries abundant with natural resources, a favorable geographical position, skilled and/or inexpensive labor, large markets, and higher purchasing power (Lucas, 1993). However, foreign investors are interested not only in mere financial profitability but also in the general business conditions in the host country which affect the stability of their ventures and the associated level of risk. This premise has resulted in a myriad of studies using different approaches to explore the numerous determinants of FDI related to the overall business climate and quality of institutions.

The idea of this paper is to shed additional light on the importance of noneconomic factors as determinants of FDI. Therefore, the emphasis is put on corruption, the rule of law, government effectiveness, the infrastructure, human capital, and so forth. The specific goal of the paper is to determine the relative importance of institutional factors in the process of making decisions to invest capital abroad. For this purpose, a comprehensive global sample of 124 countries was created, with a database spanning over a 24-year period, assembled from relevant sources, and the dynamic panel Generalized Method of Moments (GMM) model is applied to answer the main question. In addition, a subsample consisting of 37 European economies was derived so as to investigate the same issue at the European level.

The results of the regression have confirmed that, in addition to the economic factors such as the intensity of economic growth, the availability of the labor force, etc., foreign investments are also induced by the existence of a favorable business environment, which is created by sound government and judiciary institutions, lower corruption, and a generally positive investment climate. In the case of Europe, this is further augmented by the association of the economy with the European Union.

This article contributes to the existing literature in several ways: first, it is the size of the sample, which covers a considerable majority of the world economy, and the time series, which is both very recent and sufficiently long to cover several business cycles; second, the database used, consisting of consistent data from the most reliable sources; and third, the applied econometric technique, which assures confidence in the conclusions as it addresses the problem of possible endogeneity and bidirectional causality among the variables.

The structure of the paper first implies the introduction, only to be followed a review of the literature provided so as to deal with the two issues: the impact of foreign investments on economic development and the importance of various factors as the FDI determinants at the macro-level. The third section elaborates on the research methodology

applied, the regression model and its variables, and the sources and scope of the data used in the study. The fourth section presents and discusses the empirical findings in the two subsections: the one related to the global sample, and the second, containing the application of the same model to a subsample of the European countries. The paper is wrapped up in the conclusion section, which contains the main findings, recommendations, and directions for further research.

LITERATURE REVIEW

During the period from 1983 to 1989, the world FDI flows were growing at an annual compound rate of around 29%, while the annual growth rate of the world income was about 8% (Graham & Krugman, 1993). This dramatic rise in the level of FDI attracted the attention of numerous researchers who strived to answer a variety of questions related to this process.

The first issue that needed scientific elaboration and which would further determine the overall attitude towards FDI was related to their impact on the economy of the recipient country. Using the postulates of exogenous growth theory (Solow, 1956) and the Cobb-Douglas production function, the research was based on the presumption that foreign investment would increase the amount of capital available in the country, enhance the quality and efficiency of the labor force, and boost the overall productivity of the production factors through the introduction of modern technologies. Numerous researchers found these theses sustainable, either through the development of economic models or on the basis of empirical research (Balasubramanyam, Salisy & Sapsford, 1996; de Mello, 1997; Hansen & Rand, 2006; Lee & Huruta, 2020).

However, the stance towards the positive impact of FDI on growth was not unambiguous. K. E. Meyer (2004) emphasized the importance of studying the possible negative effects of FDI, not only to counter the claims of the opponents of globalization but also to develop appropriate policies aimed at attracting FDI if positive impacts prevailed over the negative

ones. In the case of Venezuela, B. J. Aitken and A. Harrison (1999) concluded that the technology spillover effects were only limited to the smaller joint ventures themselves, whereas the productivity of the companies with no foreign participation actually suffered from the competition. The importance of certain preconditions for recipient countries to benefit from FDI was confirmed in many studies, and they included financial development (Hermes & Lensink, 2003; Alfaro, Chanda, Kalemli-Ozcan & Sayek, 2007), technological development and the existence of technological gaps (De Mello, 1997), or the availability of human capital (Borensztein, Gregorio & Lee, 1998; Xu, 2000). V. Bilas and S. Franc (2022) investigated the impact of FDI on economic growth on a sample of the thirteen new European Union member states and concluded that there was a long-term cointegration among FDI, GDP, and exports, but the overall results were ambiguous.

The second popular issue among the academics was to detect the most important determinants of FDI flows, i.e. to identify what made particular countries more attractive as destinations for FDI compared to others. Comprehensive reviews of the relevant literature on this topic are provided by S. Tocar (2018) and J. Paul and M. M. Feliciano-Cestero (2021). FDI determinants are usually classified as economic and noneconomic, but the results of the studies investigating their impact are not unequivocal.

The level of the GDP and economic growth rates are most often cited as the most important economic determinants of FDI. The examples of such studies are the papers by A. Chowdhury and G. Mavrotas (2006) in the case of Chile, Malaysia and Thailand; H. Hansen and J. Rand (2006), for a sample of 31 developing countries; and N. Saini and M. Singhania (2018), who find a positive impact of economic growth on FDI in the case of developed but not in the case of developing countries, and so forth. C. S. Ho and H. A. Rashid (2011) study the ASEAN countries and conclude that the rate of economic growth and the trade openness of the country are the most universal determinants of FDI in the region, with growth having a somewhat unexpected negative sign, whereas openness positively affecting inward

foreign investments. A. Q. Khachoo and M. I. Khan (2012) analyze a sample of 32 developing countries and, in addition to the GDP, find that lower labor costs and the developed infrastructure have a positive impact on FDI, whereas trade openness seems to be insignificant. The importance of lower labor costs is also confirmed by M. Mateev (2009) in the case of the European transition economies. N. Saini and M. Singhania (2018) confirm the importance of trade openness, whereas gross fixed capital formation is a relevant determinant only in the case of developing economies.

Noneconomic determinants also play a significant role in decisions to invest abroad. M. Mateev (2009) and M. Barassi and Y. Zhou (2012) find a significant negative relationship between the level of corruption in a country and the inflow of foreign investments. B. G. Buchanan, Q. V. Le and M. Rishi (2012) explore the impact of institutional quality on FDI inflows and FDI volatility and conclude that institutional quality has a positive impact on FDI levels and a negative impact on FDI volatility. J. Du, Y. Lu and Tao (2012) conclude that property rights protection has a positive impact, whereas efficiency in the enforcement of contracts is found to have a negative impact on FDI. As their study covers only FDI in China, they attribute this surprising outcome to the cultural differences between foreign investors and China as the recipient country. R. Sparks, N. Desai and P. Thirumurthy (2014) conclude that economic factors explain only 22.5% of FDI inflows. The existence of appropriate institutions is important to attract foreign investors, as they need not only markets and natural resources, but also a business-friendly environment to run their businesses. The level of the restrictiveness of a country's policies towards foreign investors is confirmed as a significant factor by F. Mistura and C. Roulet (2019). Applying an augmented gravity model to a sample of 60 countries, they find that the liberalization of policies could significantly increase bilateral FDI flows. The importance of a positive investment climate is also emphasized by K. Sekkat and M. Veganzones-Varoudakis (2007). Their study of the developing countries in South Asia and Africa also stresses the importance of the infrastructure and political and economic stability as factors.

Some papers investigate the validity of previous findings. T. S. Eicher, L. Helfman and A. Lenkoski (2012) question the robustness of the most often cited determinants of FDI. Their findings from a regression based on a comprehensive list of potential factors only confirm the robustness of the size of the domestic market as an FDI determinant. Similarly, B. A. Blonigen and J. Piger (2014) fail to confirm the validity of many variables usually used in studies of FDI determinants and especially point out the fact that the importance of government intervention in attracting FDI is unsupported by the study. The only valid step they recommend is the inclusion of the country in bilateral agreements and regional integrations.

Notwithstanding a plethora of research in this topic, it has been found in this research study that the gap still needs to be filled so as to obtain a complete picture of the factors influencing the international movement of capital. Namely, all of the cited studies are marked by significant shortcomings when general conclusions are to be drawn. Some of them are based on fairly limited samples of countries: H. Hansen and J. Rand (2006) analyze 31 developing countries; M. Mateev (2009) uses eight countries from Central and Southeast Europe; A. Q. Khachoo and M. I. Khan (2012) use a sample of 32 developing countries; the sample of N. Saini and M. Singhania (2018) consists of 20 countries; J. Paul and P. Jadhav (2020) analyze 24 emerging economies, and so on. In addition, the mentioned studies either cover considerably short periods of time or the data refer to the periods of a more distant past, which poses a significant drawback when drawing conclusions in today's dynamic world (for instance, M. Mateev (2009) covers the period from 2001 to 2006; A. Bénassy-Quéré, M. Coupet and T. Mayer (2007) - the pre-2000 period; A. Q. Khachoo and M. I. Khan (2012) cover the period from 1982 to 2008; N. Saini and M. Singhania (2018) cover the period from 2004 to 2013, etc.). B. G. Buchanan *et al* (2012) use a fairly large sample of 164 countries, but a limited period (from 1996 to 2006). Also, many of the studies apply basic econometric techniques based on panel regressions, and the data used are sometimes inconsistent, stemming from various databases or being individually collected by the researchers themselves. In this study, this has been to be a

sufficient justification for comprehensive research in the topic, covering a broad sample of countries and a lengthy timeseries with the most recent data from respectable sources and the use of appropriate econometric methods.

METHODOLOGY AND DATA

The paper basically intends to determine the influence of various factors on the level of FDI inflows, with an emphasis on the institutional determinants. More precisely, the study aims to test the importance of institutional development and governance quality, as well as the levels of the infrastructure development and human capital, as the determinants of the attractiveness of a country as an investment destination. Institutional development and governance quality are represented by the three main variables: the level of corruption, the rule of law, and the effectiveness of the government. The two additional variables (namely the infrastructure and gross fixed capital investments) are added so as to indirectly reflect the general business conditions of a country, and the study is performed at both the global and European levels. As a result of the comprehensive review of the relevant empirical literature, the following research hypotheses regarding the relative importance of the noneconomic variables have been formulated:

- H1: Institutional development quantified by the levels of corruption, government effectiveness, and the rule of law is an important determinant of the attractiveness of a country as a foreign investment destination.
- H2: Institutional factors play an important role in foreign investors' decisions to invest in Europe.
- H3: The other noneconomic factors are significant determinants of foreign investments both in the world and in Europe.

A very broad sample consisting of 124 countries was created for this purpose. The entire available database covers the period from 1996 to 2020, but the last

year was omitted in order to avoid the impact of the COVID-19 crisis, so the final time series contains 24 years of data (from 1996 to 2019). A regression model was set up, in which net FDI inflows into a particular country are used as the dependent variable, in relative terms, as a ratio to GDP. The entire timeseries is divided into three-year periods, so there are a total of eight country-year observations per variable. As the level of FDI in a country could fluctuate thoroughly on an annual basis, three-year averages for all the variables in the regression are used to smooth out such variations.

First, the assumption that the level of FDI in a country (in relative terms) is a function of a set of institutional (I), economic (E) and noneconomic factors (NE) is made:

$$FDI = f(I, E, NE)$$

The factors in the main focus of the study are those depicting the quality of institutions in the country, and they are represented by the following variables:

- the level of corruption ($CORRUP$), which is proxied by the indicator *Control of Corruption* taken from the World Bank Worldwide Governance Indicators Database ($WBWGID$). This aggregate indicator is derived as a perception of the extent to which public power is abused for private benefits, and ranges between -2.5 (the highest level of corruption) and +2.5 (the lowest level of corruption).
- the rule of law (LAW), as a measure of the overall quality of the legislature and the judicial system (the enforcement of contracts, the police, courts, property rights, etc.). The estimate of the rule of law from the $WBWGID$ is used, which ranges between -2.5 (the lowest level of the rule of law implementation) and +2.5 (the highest level of the rule of law implementation).
- government effectiveness ($GOVEFEK$), as an indicator of the overall government performance, measured by the World Bank Government Effectiveness Index. The index spans between -2.5 (the lowest level of effectiveness) and +2.5 (the highest level of effectiveness) and is taken from the $WBWGID$.

The above three variables are at the core of this study. Their impact on FDI is investigated separately as their mutual correlations are very high and would pose a multicollinearity problem if used in the same equation.

The additional variables reflecting the institutional environment in a country are as follows:

- the infrastructure development (INFRA) - this variable is taken as noneconomic because it reflects the quantity and efficiency of the efforts made by governments to provide diverse infrastructural services even when the infrastructure is a result of private investments. The percentage of the total population with access to electricity from the World Bank World Development Indicators Database (WDID) is used as a proxy because all the other corresponding infrastructure indicators are unavailable in sufficiently long data timeseries.
- the total amount of fixed capital investments in the economy (the gross fixed capital formation - GFCF) from the World Bank WDID - although this is an economic variable, it serves as a proxy for the overall business conditions in the country. In the model, the GFCF to the GDP ratio is used.

In addition to the basic independent variables, a set of control economic and noneconomic variables are included in the regression.

The economic variables include:

- the GDP *per capita* (GDP), as a measure of the level of economic development and the purchasing power of the population, used as a log value;
- growth (GROW), which is calculated as a ratio between the log values of the GDP *per capita* for two consecutive years;
- the level of financial development (FINDEV) - countries with more developed financial systems are expected to be more attractive to foreign investors. The usual proxy for this variable in the literature is the ratio of the domestic credit extended to the private sector by banks (as a percentage of the GDP). This variable is used in the log-level form.

- trade openness (TRADE), as a ratio between the sum of exports and imports to the GDP. More open economies are expected to be more attractive as investment destinations due to the lower import and export barriers, also presumably indicating their higher level of competitiveness, on the other hand.
- the unemployment rate (UNEMP), and
- the inflation rate (INFL - the annual GDP deflator).

All of the above economic variables are obtained from the World Bank WDID.

The noneconomic control variables include:

- human capital (HC), represented by the human capital index from the Penn World Tables, based on the average years of schooling from R. J. Barro and J. W. Lee (2013) and an assumed rate of return to education, based on the Mincer equation estimates (Psacharopoulos, 1994);
- accession to and membership in the European Union (EUACC), which is used as a dummy variable, taking the value of 1 for the year when a country was either a candidate country or a member country of the European Union, and 0 otherwise. This variable is only used in the regression model applied to the subsample of the European countries and is expected to reflect the relative importance of the membership of a country in the European Union to foreign investors.

The basic regression model is defined as:

$$FDI_{i,t} = \alpha INST_{i,t} + \beta_1 ECON_{i,t} + \beta_2 NONECON_{i,t} + \gamma_t + \delta_i + \varepsilon_{i,t} \quad (1)$$

where:

- $FDI_{i,t}$ is the relative measure of FDI net inflows to the country i in the period t
- $INST_{i,t}$ is the vector of the institutional variables for the country i in the period t
- $ECON_{i,t}$ is the vector of the control variables of economic nature
- $NONECON_{i,t}$ is the vector of the control variables of noneconomic nature

- γ_t is the year dummy controlling for the time-varying shocks
- δ_i is the dummy variable controlling for the country-specific effects
- $\varepsilon_{i,t}$ is the residual value.

However, there is possible endogeneity among the variables in the model, i.e. the explanatory variables might also be affected by the dependent variable. Namely, one should assume bidirectional causality between the amount of FDI, on the one hand, and economic development and/or economic growth, on the other (confirmed by A. Chowdhury and G. Mavrotas, 2006; H. Hansen and J. Rand, 2006; G. Ruxanda and A. Muraru, 2010). Also, the level of financial development is important for prospective foreign investors; yet, on the other hand, foreign investments usually include investments made by foreign banks and other financial institutions, thus reversibly influencing the amount of FDI. Therefore, the application of the OLS would result in biased results. To overcome this problem, the two-stage dynamic panel GMM econometric tool first described by M. Arellano and S. Bond (1991) is applied as the tool able to resolve simultaneity biases. A dynamic panel is recommended for situations where the number of cross-sections is high, while the number of periods is low. Since the timeseries consists of eight values per country per variable, the dynamic panel GMM model is appropriate.

In said dynamic GMM model, the basic equation of interest transforms into:

$$FDI_{i,t} = (\alpha-1)\delta FDI_{i,t-1} + \beta INST_{i,t} + \gamma CECON_{i,t} + \delta CNONECON_{i,t} + \eta_i + \mu_t + \varepsilon_{i,t} \quad (2)$$

where $FDI_{i,t}$ is the level of FDI in the country i in the period t as a percentage of the GDP; $INST_{i,t}$ is the set of the explanatory (institutional) variables; $CECON_{i,t}$ is the set of the control economic variables; $CNONECON_{i,t}$ is the set of the control noneconomic variables η_i are the unobserved and country-specific fixed effects; μ_t are the time-fixed effects, and $\varepsilon_{i,t}$ is the error term. The instruments should be the variables correlated with the endogenous variables, but not directly with the dependent variable. In order to obtain a dynamically complete model, the second lag of the dependent variable is added when necessary

(Kiviet, 2020). The lagged values of the independent variables are used as instruments, with the lag level corresponding to the need so as to avoid the serial correlation issue. This paper applies the Sargan test to check for endogenous phenomena, whereas the Arellano-Bond tests are used to detect the serial correlation of errors in the first differences.

RESULTS AND DISCUSSION

Descriptive statistics

Prior to presenting the regression results, the descriptive statistics are provided so as to gain an insight into the analyzed sample. Since the gathered data create a panel of 124 countries covering a 24-year period, the presentation of mere averages of the variables would not provide valuable information. Instead, the median values by variable by continent for the first and last years of the data series are presented in order to depict the progress each continent has made with respect to the variables of interest throughout the covered period. The second column in each table represents the number of the countries included in the sample.

The analysis of the descriptive statistics provides us with some interesting insights. With respect to the economic variables, an improvement is evident in almost all the cases. The average GDP *per capita* has increased, and trade openness, financial development, and the share of FDI in the GDP have risen as well, while unemployment has dropped, and inflation seems to have posed no problem (as of 2019).

On the other hand, the trends in the institutional and other noneconomic variables are less encouraging. Although there has been obvious progress with respect to human capital and the infrastructure development, problems with corruption and the application of the rule of law still persist. In two of the continents, the situation with corruption (on average) has worsened (the lower index value), while the situation is similar with the rule of law and government effectiveness indices, although being somewhat differently geographically distributed.

Table 1 The descriptive statistics by continent - the economic variables, the median values

	Year	GDP	GFCF	FDI	TRADE	INFL	FINDEV	UNEMP	
Africa	33	1996	833	19.19	0.94	50.95	8.02	50.95	8.02
		2019	1349	21.90	1.99	57.94	3.00	57.94	3.00
Asia	32	1996	2067	23.89	1.10	68.10	8.11	68.10	8.11
		2019	5309	27.16	2.05	64.86	1.88	64.86	1.88
Australia	3	1996	28581	22.34	1.14	55.12	2.73	55.12	2.73
		2019	40599	23.33	2.81	54.34	3.42	54.34	3.42
Europe	37	1996	7804	20.79	1.38	70.08	7.64	70.08	7.64
		2019	18167	21.58	2.95	101.80	2.20	101.80	2.20
North America	10	1996	4042	18.64	1.57	52.85	9.79	52.85	9.79
		2019	4660	20.46	2.69	70.87	3.43	70.87	3.43
South America	9	1996	4396	18.64	2.55	39.53	11.42	39.53	11.42
		2019	6614	18.98	2.08	46.94	3.06	46.94	3.06

Source: World Bank WDID and World Bank WBWGID

Table 2 The descriptive statistics by continent - the noneconomic variables, the median values

	Year	CORRUP	LAW	GOVEFEK	HC	INFRA	
Africa	33	1996	-0.57	-0.62	-0.58	1.44	15.00
		2019	-0.56	-0.63	-0.53	1.86	48.06
Asia	32	1996	-0.36	-0.18	-0.01	2.21	98.44
		2019	-0.31	0.05	-0.27	2.71	100.00
Australia	3	1996	1.88	1.77	1.71	3.27	100.00
		2019	1.83	1.57	1.73	3.41	100.00
Europe	37	1996	0.42	0.62	0.77	2.93	100.00
		2019	0.57	0.83	0.53	3.43	100.00
North America	10	1996	-0.54	-0.16	-0.62	2.08	81.79
		2019	-0.68	-0.31	-0.71	2.52	98.36
South America	9	1996	-0.40	-0.14	-0.26	2.36	92.87
		2019	-0.34	-0.09	-0.43	2.84	99.76

Source: World Bank WDID and World Bank WBWGID

The global sample - results and discussion

The results of the GMM regression are presented in Tables 3 and 4.

The results of the regression reveal some interesting findings. The variables in the main focus of this study,

those related to the quality of institutions - the rule of law and government effectiveness, show evidence in support of the thesis that foreign investors favor business environments with stronger institutions and more efficient judicial systems. The positive sign of the gross fixed capital formation indicates that the overall investment climate in a country positively

affects foreign investors' decision-making as well (in line with K. Sekkat and M. Veganzones-Varoudakis, (2007)).

The lack of significance for the infrastructure variable could be surprising, but one possible explanation is that the proxy used for this variable (access to electricity for the population) is perhaps a poor representative for the availability of the host of the services embedded in the infrastructure, such as roads, railways, information networks, and so forth.

The negative relationship between inflation and FDI implies the fact that foreign investors globally prefer more stable economic environments. They also prefer to invest in growing economies and in those with higher rates of unemployment, which usually reflects in lower labor costs. Trade openness has a negative sign but is statistically insignificant (in line with A. Q. Khachoo and M. I. Khan, 2012).

Financial development and human capital have not proven to be significant, most likely due to the very diverse sample of the countries, as some regions attract investors by providing skilled labor force, and others by offering unskilled but cheap labor force.

The European sample - results and discussion

Another question of interest in this paper is whether the same conclusions would be drawn from the subsample containing only European economies. The special focus on this continent is a result of its specific characteristics: a relatively high GDP *per capita*, a higher degree of political stability, predominantly older democracies, and the dominance of the European Union regulations, higher degrees of urbanization and the infrastructure development, and so on. For this purpose, as many as 37 European countries were extracted from the global sample, and the same model was applied to the subsample, too. As is mentioned above, the dummy variable reflecting the country's accession to or membership status in the European Union is added to this regression.

Table 3 The regression results using the GMM - the global sample

	(1)	(2)	(3)
FDI _{t-1}	-0.037 (0.522)	-0.084 (0.118)	0.007 (0.866)
FDI _{t-2}	-0.022 (0.581)	0.005 (0.902)	0.004 (0.919)
CORRUP	4.797 (0.294)		
LAW		14.945*** (0.004)	
GOVEFEK			5.629* (0.081)
INFRA	-0.074 (0.406)	0.060 (0.426)	-0.032 (0.629)
GFCF	0.730*** (0.000)	0.837*** (0.000)	0.766*** (0.000)
GDP	-8.790 (0.415)	-24.362** (0.042)	-12.388 (0.186)
GROW	49.614*** (0.002)	55.766*** (0.004)	42.387** (0.005)
INFL	-0.273* (0.093)	-0.049 (0.754)	-0.259** (0.049)
TRADE	-0.008 (0.873)	-0.015 (0.781)	0.001 (0.985)
FINDEV	0.526 (0.878)	2.904 (0.450)	-0.166 (0.952)
UNEMP	0.598*** (0.005)	0.550** (0.028)	0.575*** (0.006)
HC	0.785 (0.863)	1.621 (0.728)	1.970 (0.619)
The countries included	124	124	124
Observations	419	419	419
Sargan test (p-value)	0.173	0.155	0.121
AR(1)	0.013	0.045	0.007
AR(2)	0.175	0.196	0.147

P-values in parentheses.

*, **, *** - denote significance at the 10%, 5% and 1% levels, respectively

The Sargan test null hypothesis: the instruments used are not correlated with the residuals.

The AR(2) null hypothesis: the errors in the first difference equation exhibit no second-order serial correlation.

Source: Authors

Table 4 The regression results for the European countries using the GMM model

	(1)	(2)	(3)
FDI _{t-1}	0.068* (0.060)	0.029 (0.212)	0.052 (0.155)
FDI _{t-2}	0.071** (0.010)	0.028 (0.247)	0.073*** (0.003)
CORRUP	10.220*** (0.000)		
LAW		3.725* (0.075)	
GOVEFEK			19.389*** (0.000)
INFRA	0.996 (0.733)	0.432 (0.830)	-2.939* (0.086)
GFCF	0.198** (0.038)	0.009 (0.955)	0.303** (0.015)
GDP	18.942 (0.177)	33.698** (0.012)	-10.279 (0.369)
GROW	66.702*** (0.000)	72.845*** (0.000)	52.768*** (0.000)
INFL	0.085 (0.168)	0.183* (0.013)	0.258*** (0.001)
TRADE	-0.228*** (0.000)	-0.279*** (0.000)	-0.212*** (0.000)
FINDEV	3.988** (0.021)	3.765* (0.059)	1.664 (0.267)
UNEMP	0.596** (0.010)	0.701*** (0.002)	0.522** (0.019)
HC	-4.673 (0.464)	-11.405* (0.089)	4.012 (0.521)
EUACC	16.239** (0.005)	18.314*** (0.001)	13.667** (0.048)
The countries included	37	37	37
Observations	147	147	147
Sargan test (p-value)	0.240	0.239	0.302
AR(1)	0.026	0.045	0.059
AR(2)	0.145	0.200	0.142

P-values in parentheses.

*, **, *** - denote significance at the 10%, 5% and 1% levels, respectively.

The Sargan test null hypothesis: the instruments used are not correlated with the residuals.

The AR(2) null hypothesis: the errors in the first difference equation exhibit no second-order serial correlation.

Source: Authors

The results presented in Table 4 provide similar answers, with even greater confidence in the importance of the institutional determinants. The significance of fighting corruption, improving government effectiveness, and providing an efficient legal system is strongly confirmed in the case of Europe, with gross fixed capital investment complementing the importance of a country's institutional setting to foreign investors. Note that the corruption index ranges between -2.5 (the highest corruption) and +2.5 (the lowest corruption), so the positive sign actually indicates a lower level of corruption (efficient fight against corruption) and a positive impact on attracting FDI (in line with Paul & Jadhav (2020)).

The impact of economic growth and the unemployment rates is as strong as it is in the global sample, while investors in the European countries also prefer to be supported by strong financial sectors. The positive relationship between inflation and FDI can be attributed to the abovementioned impact of economic growth (in line with I. Kersan-Škabić, 2013). Specifically, the economies with higher growth rates are more likely to undergo periods with higher inflation, rather than exhibit deflationary tendencies. A surprising finding is that the higher levels of trade openness are detrimental to foreign investments. A probable explanation is the finding of G. Nicoletti, S. S. Golub, D. Hajkova, D. Mirza and K. Yoo (2003), according to which while tariff barriers have a negative impact on FDI inflows, nontariff barriers have a positive impact (with FDI probably serving as a means to overcome the latter). Finally, the EU candidate countries, as well as its members, are more attractive to foreign investors as they provide, or are about to provide, full access to the large European market of more than 450 million people with significant purchasing power and the accompanying highly developed industrial and service sectors (in line with B. A. Blonigen & J. Piger (2014)).

CONCLUSION

The study confirms most of the expected relations between the analyzed variables and the foreign investment inflows. On the one hand, the corporate

and industrial factors aside, it can be concluded that foreign investors are mostly oriented towards investing in growing economies and countries with abundant labor force available. However, institutional development plays an important role in attracting foreign investors, as FDI is significantly higher in the countries with less corruption, effective governance, and higher confidence in the legal system. This is also supported by the fact that FDI is higher in the countries in which the overall level of capital investments is higher, reflecting the importance of the general investment climate and the business environment, which governments bear ultimate responsibility for. The most important findings originating from the analysis of the European countries are in line with those from the global sample, providing reassurance of the importance of institutional development as a part of the overall attractiveness of a country as an investment destination. In addition, it confirms the importance of the inclusion of the economy in a broader association as a means to overcome the problem of a small market, but also to assure investors of the consistency and harmonization of its system and policies with a set of broadly accepted standards.

The above conclusions support the hypotheses 1 and 2 of this study as they are set above in the paper. The hypothesis 3 is only partly confirmed. Representing the average educational level, human capital lacks statistical significance in the study, but investors are heavily influenced by the status of a country as a member or a candidate member of an important economic and political association.

These findings teach several important lessons to the policymakers in the countries enthusiastically awaiting foreign investors. First, the amount of FDI inflows cannot replace investment made by domestic businesses. The positive sign of the GFCF variable confirms the fact that foreign investments are only complements to, rather than substitutes for domestic investments. Second, the attractiveness of a country is not to be taken as given by its geographical position and natural endowments, but a lot could be done by improving the quality of governance and the overall

political and social systems of the country itself, as well as through its association with a prominent regional community. Therefore, accentuating natural limitations could be the initial but not sufficient excuse for the absence of FDI.

What distinguishes this paper from comparable research in the topic is the comprehensive sample incorporating countries from all over the world, the appropriate econometric technique, and the series of most recent data covering a time span of 25 years. Almost all the data are taken from the same source providing for their consistency. All the other reviewed papers cover shorter time periods, most often biased by particular circumstances (economic transition, economic crises, etc.), so the length of the timeseries should provide protection from such influences.

One probable limitation of the current research reflects in the nature of some of the data used in the study. Apart from their relevance and consistency, some data are based on the estimates and surveys subject to differences in perceptions compared to the accurate data obtained through statistical censuses and accounting information. Also, apart from being a comparative advantage of the study, the breadth of the global sample might also be a source of ambiguity due to the diversity of the economies included in the sample in geographical, political, cultural, and economic terms. Therefore, the results originating from the more consistent European subsample could be considered more convincing.

Undeniably, the study on this topic is far from concluded. Probable directions for future research include, but are not limited to, studies of particular regional groupings of countries, studies concentrating on more consistent samples of economies, the use of potential additional institutional variables, and the inclusion of more exact data as they become available. More ambitious researchers should also consider including micro-level variables at the company or sectoral levels in order to encompass potential interactions between the two groups of determinants.

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VEZA INSTITUCIONALNOG RAZVOJA I PREFERENCIJA STRANIH INVESTITORA - SVEOBUH VATNA GMM STUDIJA

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Ovaj rad istražuje uticaj različitih faktora na nivo stranih direktnih investicija u jednoj zemlji, sa posebnim naglaskom na neekonomske, uglavnom institucionalne odrednice. Korišćenjem širokog uzorka od 124 zemlje i podataka za period od 1996. do 2019. godine, primenjuje se dinamička panel GMM regresija. Rezultati regresije pokazuju da relativni udeo stranih direktnih investicija u BDP-u pozitivno zavisi od razvoja institucija u zemlji. Da bi privukle strane investitore, zemlje domaćini treba da naprave značajan napredak u funkcionisanju pravnog sistema, efikasnosti vlade i borbi protiv korupcije, kao i da stvore povoljan investicioni ambijent. Primena istog regresionog modela na poduzorak evropskih zemalja potvrdila je ove nalaze, šaljući važnu poruku donosiocima odluka koji moraju preduzeti odlučne korake ka otklanjanju sistemskih nedostataka, umesto da subvencionišu strane investitore, što je praksa sa sumnjivom isplativošću na makro nivou.

Ključne reči: strane direktne investicije, institucije, korupcija, vladavina prava

JEL Classification: F21, O43, P48

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THE EXAMINATION OF THE DYNAMIC LINK BETWEEN DEFENSE BURDEN AND UNEMPLOYMENT: THE EVIDENCE FROM THE POST-SOVIET COUNTRIES

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The Eastern Bloc had been dissolved by the end of the Cold War period, and the New World Order was established. The rapid liberalization process accelerated transition to the free market economy. In this transition period, however, numerous political tensions occurring between some countries also transformed into conflicts and wars. Therefore, countries allocate their scarce resources to their national security rather than their development objectives, simultaneously gradually increasing their defense expenditures. Accordingly, the present study aims to examine the existence of the dynamic relationship between defense burden and unemployment for the selected nine post-Soviet countries that emerged after the collapse of the Soviet Union. By incorporating the annual data set of the nine post-Soviet countries over the period between 1996 and 2021, the results revealed that defense burden had no influence on unemployment in the short run, but did have a positive effect in the long run.

Keywords: defense burden, unemployment, post-Soviet countries, panel data

JEL Classification: C33, F51, H56, P20

INTRODUCTION

Together with the unprecedented pace of globalization, the collapse of the Eastern Bloc by the end of the Cold War brought a new political and economic order for

the ex-communist economies. The desire to adopt the free-market economy embracing price mechanisms and institutional reforms such as liberalization of trade and capital accounts led regimes to induce radical and structural changes in those economies. It should be noted that the process of transition to the free-market economy occurred differently in different countries, that being due to their respective economic conditions, geopolitical concerns, and

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institutional capabilities. In this context, the biggest number of the post-Soviet Union countries (except for the Baltic countries, namely Estonia, Latvia, and Lithuania) experienced severe economic, political, and security issues. For political and security reasons, the Commonwealth of Independent States (CIS) were eager to allocate more resources to their military operations instead of investing in developmental aspects aiming to alleviate all forms of poverty.

On the other hand, the economic effects of defense expenditures are among the most profound and intricate topics that have drawn special attention from scholars, both theoretically and empirically. Nevertheless, many of those studies have mainly discussed the effects on economic growth attributed to defense expenditures. Also worthy of noting is the fact that the interconnectedness between the output growth and unemployment is indicated by the famous macroeconomic phenomenon called Okun's Law, which indicates an inverse relationship between the output growth and unemployment, which is why a possible nexus between defense expenditures and unemployment deserves to be paid special attention to since the latter relates to the output growth. In this respect, this paper aims to pursue the dynamic link between unemployment and defense burden, which is measured by the ratio of overall defense expenditures to the gross domestic product (GDP) for the selected post-Soviet countries.

Considering the interaction between defense expenditures and unemployment, there are three mechanisms standing out commonly referred to in the literature so far. The first mechanism is the spillover effect. With the construction of the military infrastructure, rising military spending would lead to productivity gains via a technology spillover to the private sector, which enables companies to demand more labor due to increasing labor productivity. The second mechanism is referred to as the reallocation effect and it induces frictional unemployment due to contraction in the military sector. From this aspect, the reallocation effect sets to the extent that employees in the military sector tend to shift to the private sector due to the decline in military

spending. The third mechanism implies that military expansion may exacerbate the pressure on the general government budget. Governments tend to collect additional taxes in order to alleviate the strain on the general government budget associated with military expansion. Thus, military expansion can create an additional tax burden on employers, which in turn could influence labor demand or supply (Tang, Lai & Lin, 2009; Sanso-Navarro & Vera-Cabello, 2015; Zhong, Chang, Tang & Wolde-Rufael, 2015). Accordingly, the pivotal hypotheses of the paper read as follows:

- H1: There are a long-run dynamic link and the causal nexus between defense burden and unemployment throughout the above-mentioned mechanisms.
- H2: Increases in defense burden tend to accelerate unemployment either in the short- or in the long run.

The fact that this empirical study differs from previous ones in various aspects and that it aims to fill the gap in the empirical literature by employing a relatively novel approach is also worth noting. Initially, this empirical endeavor would be the first to investigate the interplay between defense burden and unemployment for the post-Soviet Union countries never analyzed in empirical analyses to date. The majority of the empirical studies in the field of defense economics have focused on the countries involved in proliferation, namely Greece, Turkey, India, and Pakistan. Moreover, with the developments in cross-sectional and panel data analysis, empirical studies have also focused on some military, political, or economic blocs, such as the NATO, the EU, and the OECD. Moreover, the economic effects of militarization have been discussed empirically in the context of conflicted regions, namely the Middle East and Africa.

Secondly, the present paper differs from the previous in the methodological aspect. To this end, the long-term dynamic link between defense expenditures and unemployment will be estimated using the Cross-Sectional Autoregressive Distributed Lag (CS-ARDL) method introduced by A. Chudik, K. Mohaddes, M.

H. Pesaran and M. Raissi (2016). In the case of the cointegration relationship, the main advantages of this method originate from it capturing the effects of cross-sectional dependence (CD) both in the short- and in the long run even though the series are integrated at different orders. Furthermore, this paper also aims to bring a novel approach in terms of causality analysis, in which context the methodology having recently been introduced by A. Juodis, Y. Karavias and V. Sarafidis (2021) will be used to determine the causal interplay among the variables of interest in this paper. Beside the presence of CD, the methodology allows for the examination of the causal nexus between the variables. There is either homogeneity or heterogeneity in the panel data. Yet, it has the size and power advantages over its counterparts depending on whether the time dimension is bigger or smaller than the cross-sectional dimension. To the best of the authors' knowledge, neither technique has been

implemented so far in identifying the nexus between military spending and unemployment specifically.

Given the aforementioned issues, the rest of the study is organized as follows: in the following section, some figures regarding the trends in unemployment and defense burden over the sampled period in which countries tend to increase their military outlays due to the tensions between them despite the recent outbreak of COVID-19 are presented; in the third section, the theoretical and empirical literature is reviewed, whereas the section four discusses the issues pertaining to the data, model, and empirical strategy to be implemented. Section five is devoted to the results and discussions derived by conducting empirical analysis. Finally, in the section six, some concluding remarks and policy recommendations are reported through the results obtained from the econometric analysis.

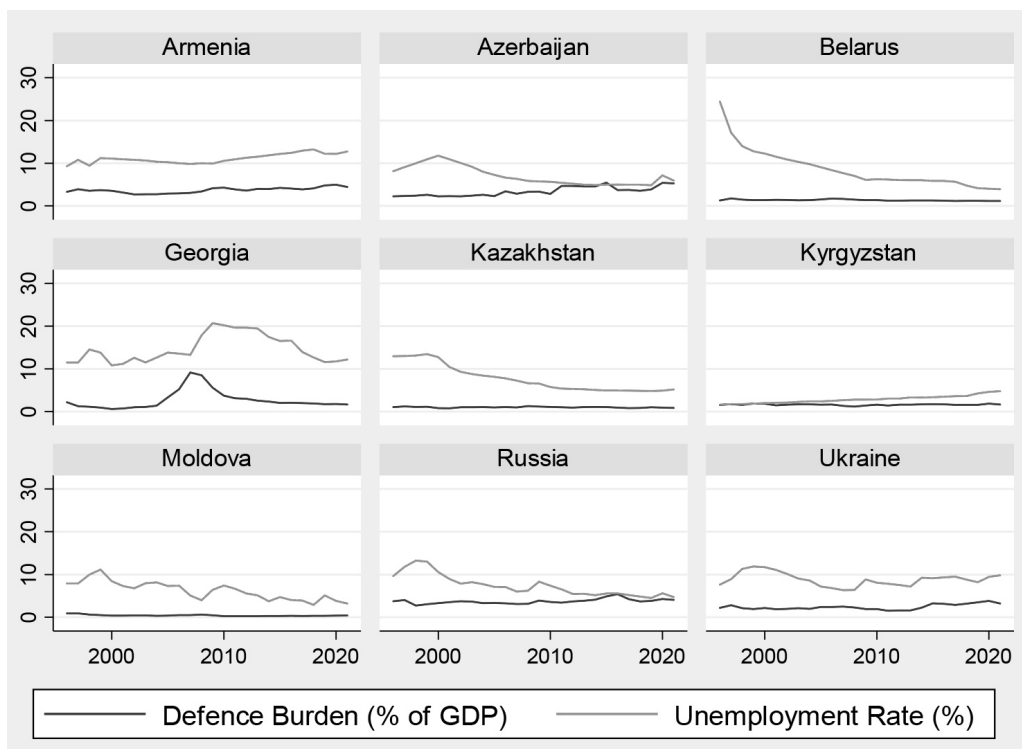


Figure 1 The trends in defense burden and the unemployment rate (in percentage)

TRENDS AND FACTS

Despite the outbreak of COVID-19 and its ongoing detrimental economic effects in a global context, the increasing tendency in favor of militarization is still continuing. As reported by the Stockholm International Peace Research Institute (SIPRI, 2023), global military expenditures have recorded a historical peak of US \$2240 and have been rising for eight consecutive years. According to SIPRI (2023), governments all around the world allocate 6.2% of their budgets to their military requirements, which also corresponds to \$282 *per capita*. One of the main reasons for the recent rising tendency in military expenditure is the ongoing warfare between Russia and Ukraine. In particular, the neighboring countries and Europe as a whole have adversely been influenced since the outbreak of the war.

Apart from those global trends in militarization, the present study specifically focuses on the selected post-Soviet countries. Accordingly, Figure 1 presents some striking trends in defense burden and the unemployment rates despite the nonexistence of a uniform tendency between these variables.

Due to ongoing operations in the Southern Caucasus, Syria, and Libya, warfare in Ukraine has forced the Russian Federation to expand its military outlays almost twofold. Similar trends are observed in the Russian Federation's neighboring countries. In this respect, Belarus and Ukraine have experienced military expansion in the recent decade. The ongoing dispute over Nagorno-Karabakh since the end of the First Nagorno-Karabakh War induced the breakout of the Second Nagorno-Karabakh War between Armenia and Azerbaijan, both countries continuously increasing their military expenditure during the last two decades. Thus, the share of the defense expenditure in the GDP for both countries is at higher levels. One of the highest records was observed for Georgia, which suffered an invasion by the Russian forces due to the severe territorial issues over Southern Ossetia. To this end, with the outbreak of invasion in 2008, the share of the defense expenditure in the GDP has reached approximately 10%.

On the other hand, unemployment rates exhibit various tendencies for each country. It should be highlighted that the unemployment rates reach high levels mostly in Armenia and Georgia. With the outbreak of the Second Nagorno-Karabakh War in 2020, the unemployment rate tends to increase in Azerbaijan as well. In the earlier transition period, the unemployment rate was the highest in Belarus as compared with the countries included in the study's sample and managed to be alleviated by the earlier periods of the 2000s. Similar tendencies are also observed in Kazakhstan, where defense burden tended to increase between 2000 and 2010, whereas the unemployment rate tended to decline in that same period. It should be noted that the sampled period also coincides with the global financial turmoil that emerged as a subprime mortgage crisis in the USA and severely influenced the real sector worldwide. In this respect, some countries included in the sample are severely influenced by the outbreak of the subprime mortgage crisis. For instance, the unemployment rate in Armenia, Georgia, Moldova, Russia, and Ukraine increased more when compared to the rest of the countries included in the sample.

LITERATURE REVIEW

Differing from the studies examining the nexus between defense expenditures and economic growth, the literature in the field of defense economics also includes the studies that aim to examine the interplay between defense expenditures and unemployment, which are relatively scanty. It should also be noted that the empirical literature has not revealed a clear-cut relationship between defense expenditures and unemployment yet, so that the mechanisms which connect the nexus between the two variables might potentially vary. Nonetheless, the majority of the empirical studies have focused on the advanced economies or regional blocs to address the interconnectedness between defense expenditures and unemployment. In this respect, M. A. Hooker and M. M. Knetter (1994, 1997) examined the effects of curtails in military procurement spending on the unemployment rate for the USA utilizing the

panel data for the USA in each study. Nonetheless, in their earlier studies, the effect of reduction in military procurement spending on unemployment had been analyzed, whereas the latter study aimed to explain the effects of cuts in military procurement spending on employment growth across the states. In their previous study, M. A. Hooker and M. M. Knetter (1994) had concluded that a reduction in military procurement spending not only explained the variations in unemployment across the USA but also swelled up to the overall unemployment level by 0.15%. By conducting standard panel regressions and instrumental variable (IV) analysis, M. A. Hooker and M. M. Knetter (1997) highlighted the fact that variations in employment growth mainly stemmed from a reduction in military procurement spending as well. For the case of France, J. Malizard (2014) aimed to examine the long-term interplay between defense spending and unemployment. It is documented that both defense and nondefense expenditures have adverse long-term effects on unemployment, whereas the effects of the former are more dominant than those of the latter. In a more recent study, C. Michael and R. Stelios (2017) investigated the long-term relationship between defense spending and unemployment for Greece, Italy, Portugal, and Spain over the period from 1960 to 2015. The results of the empirical analyses confirmed the fact that increasing defense spending had reduced unemployment in Portugal and Greece, whereas the result was different in the case of Spain.

Advanced economies aside, numerous studies also focus on developing countries in the context of defense expenditures and the employment/unemployment nexus, to which end P. J. Dunne and D. Watson (2000) added to debate by considering the sectoral approach. In this context, employing the bounds test approach to cointegration, their findings indicate the fact that employment growth in the manufacturing sector of South Africa is negatively influenced by rising military expenditure in the long run. J. Yildirim and S. Sezgin (2003) constructed the constant elasticity of the substitution (CES) type production function in examining the effects of military expenditure on employment in Turkey in the long run by incorporating the annual timeseries data spanning from 1950 to 1997. The results revealed

the fact that military expenditures tended to have detrimental effects on employment either in the short- or in the long run so that the military budget was allocated more on imported cutting-edge arms. In contrast to the results reported by J. Yildirim and S. Sezgin (2003), Jr.-T. Huang and A.-P. Kao (2005) reported the positive long-term interconnectedness between the military outlays and employment for Taiwan. L. Qiong and H. Junhua (2015) estimated the long-term relationship between military expenditure and unemployment for China by performing the Autoregressive Distributed Lag (ARDL) Approach to Cointegration, which was also employed in the studies carried out by J. Yildirim and S. Sezgin (2003) and Jr.-T. Huang and A.-P. Kao (2005). The results demonstrated the fact that rising military expenditure upswung the overall unemployment rate while the nonmilitary components of government expenditure alleviated the overall unemployment rate. In their more recent paper, M. Azam, F. Khan, K. Zaman and A. M. Rasli (2016) focus on the four South Asian Association for Regional Cooperation (SAARC) countries to reveal the presence of the long-term relationship between military expenditure and unemployment by incorporating the annual panel dataset covering the period between 1980 and 2013. Although the results of the Panel Vector Error Correction Mechanism (VECM) test indicated the nonexistence of the short-term relationship, the long-term inverse relationship tended to exist between the military outlays and the overall unemployment rate. In a more recent study, I. A. Raifu and J. A. Afolabi (2023) considered the effect of structural breaks in dealing with the nexus between military spending and unemployment for South Africa by incorporating the quarterly timeseries data spanning from 1994 to 2019. Implementing the linear and nonlinear ARDL cointegration approaches, the authors came to the findings asserting that rising military spending is detrimental to unemployment in the long run.

With the developments in timeseries and panel data analyses, some empirical studies have also addressed the causality nexus between defense expenditures and employment/unemployment. To that end, S. Paul (1996) utilized a large data set of the OECD countries for the period between 1962 and 1988 in order to

investigate the presence of the causality relationship between defense spending and unemployment. The results showed that no significant causal interplay between defense spending and unemployment tended to exist overall. However, defense spending has substantial effects on the unemployment rate for Germany and Australia. For a large panel data set of 46 countries, J.- H. Tang *et al* (2009) find little or no evidence regarding the causality nexus from unemployment to military expenditure. Moreover, the selection of the proxy variables for militarization significantly influences the results, in which context they concluded that, for the non-OECD countries, unidirectional causality existed running from military expenditure to unemployment to the extent that military spending was expressed as a percentage of the GDP. Employing the panel bootstrap causality test, M. Zhong *et al* (2015) report the presence of unidirectional causality running from military spending to unemployment for Canada, Japan and the USA, whereas there it tends to be the opposite form of causality for France and Germany. In addition, the results reveal the existence of bidirectionality in Italy and the UK. Analogous to M. Zhong *et al* (2015), M. Sanso-Navarro and M. Vera-Cabello (2015) employed the panel bootstrap causality test to examine the causality nexus between military expenditure and unemployment for the EU-15 countries. It was documented that there was little evidence regarding the causality nexus between military expenditure and the unemployment rate. Nevertheless, a causal relationship was observed for some countries where personnel expenditure from the military budget was more dominant, or conscription was in force. Since most of the macroeconomic variables and interaction among them potentially exhibit asymmetric relationships, E. Anoruo, U. Akpom and Y. D. Nwoye (2018) investigated the nexus between military spending and unemployment for eight African countries by utilizing the Panel Smooth Transition Regression (PSTR) approach to account for the nonlinear association between the former and the latter. In the last instance, it was accentuated

that military expenditures had a positive effect on unemployment during the low inflation periods, whereas the opposite applied during the high inflation periods. Therefore, it is recommended that military spending should be increased during the period of low inflation periods so as to mitigate the unemployment problem in those countries.

More recently, J. Becker (2021) has examined the effect of unemployment on defense burden disaggregating the latter into personnel expenses and equipment modernization. By employing the panel-corrected standard errors and the Two-Stage Least Squares (2SLS) approaches on the annual panel data set of 34 countries from NATO and the EU over the period from 1991 to 2019, it was determined that defense burden strongly hinged on the developments in the labor markets. Moreover, the results revealed that the countries with high unemployment rates tended to spend less on defense and shift the resources from equipment modernization to personnel expenses. Apart from the aforementioned studies, G. Dudzevičiūtė and A. Šimelytė (2022) discussed the impact of military personnel and some major macroeconomic indicators on defense burden for Greece, Turkey, and the USA, which are the NATO members with the highest military expenditures. By incorporating the annual time series data and conducting the ARDL analysis, the results revealed that defense burden negatively interacted with the output changes in the cases of Turkey and Greece. On the other hand, inflation and the number of military personnel tended to have positive effects on defense burden in all the three countries in the long run.

In accordance with the intricate nature of the nexus between defense spending and unemployment, the current empirical literature exposes a sporadic situation as well. Beneath the veneer of this intricacy in the empirical literature, the next section aims to establish the model and empirical strategy in line with theoretical discussions and pivotal hypotheses of the paper.

DATA, MODEL AND ESTIMATION STRATEGY

Data

The primary objective of the present study is to investigate the long-term dynamic effects of defense burden on unemployment by paying special attention to the post-Soviet countries, most of which are also the members of the Commonwealth of Independent States (CIS)¹. Moreover, the outbreak of the war between Russia and Ukraine, the disputes over the Caucasus region between Russia and Georgia, the conflict between Armenia and Azerbaijan over the issue of Nagorno-Karabakh, and the internal political tensions in Kazakhstan and Kyrgyzstan are the pivotal factors in the selection of the sample countries. On the other hand, three Baltic countries (Estonia, Latvia and Lithuania) were excluded since they are currently the members of the EU and the NATO. Hence, due to the data limitations, the empirical analysis was limited to the nine post-Soviet countries by utilizing the annual balanced panel data set that spanned over the period from 1996 to 2021². Throughout the theoretical discussions and the main hypotheses of this present paper, empirical analysis was carried out incorporating the three variables in accordance with the studies by J.- H. Tang *et al* (2009), J. Malizard (2014), M. Zhong *et al* (2015), M. Sanso-Navarro and M. Vera- Cabello (2015), L. Qiong and H. Junhua (2015), Azam *et al* (2016) and Anoruo *et al* (2018). Apart from the main variables of interest, namely the unemployment rate (the dependent variable) and the defense burden measured by military expenditure as a percentage of the GDP, the GDP *per capita* was also

included as a proxy variable in identifying whether an inverse relationship between the output growth and unemployment is perceived, which is well-known macroeconomic phenomena pioneered by Okun's Law. Except for the data on defense burden, the data on unemployment and the GDP *per capita* were compiled from the World Development Indicators (WDI) Database of the World Bank. The data pertaining to defense burden were gathered from the Military Expenditure Database of the Stockholm International Peace and Research Institute (SIPRI), which generates data on military outlays, arms production and trade in a global context. It should also be noted that all the variables were converted into a natural logarithmic form. The abbreviations, definitions, and sources of data regarding the variables are presented in Table 1.

On the other hand, Table 2 displays the descriptive statistics regarding the variables incorporated in the empirical analysis. Since the difference between the maximum and minimum values is higher for defense burden (LD) and the unemployment rate (LU) is lower, which is the main interest of the variables, the values of the standard deviation are relatively lower indicating a lesser volatility across the countries and the time periods. However, the standard deviation of the GDP *per capita* (LY) is strikingly higher, so that the difference between the maximum and minimum values is significantly higher.

Model and estimation strategy

In order to reveal the dynamic link between defense burden and unemployment, the following baseline specification will be incorporated by including the GDP *per capita* as the output growth proxy:

Table 1 The definitions and sources of the variables

Variables	Unit	Abbreviation	Data Source
Unemployment Rate	As percentage	LU	World Bank
Defense Burden	Military expenditure as a percentage of the GDP	LD	SIPRI
Real GDP <i>per capita</i>	Constant 2015 US \$	LY	World Bank

Note: The capital L denotes the natural logarithm of the corresponding variable.

Source: SIPRI and the World Bank.

Table 2 The descriptive statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
LU	234	0.5818	0.7414	-1.3360	2.2147
LD	234	1.9868	0.5283	0.4842	3.1945
LY	234	24.1888	1.7227	21.7769	28.0299

Note: The descriptive statistics of all the variables are computed in their natural logarithms.

Source: Authors.

$$LU_{it} = f(LD_{it}, LY_{it}) \tag{1}$$

where LU_{it} , LD_{it} , and LY_{it} denote the natural logarithms of unemployment, defense burden, and the GDP *per capita*, respectively, whereas the subscripts i and t denote the cross-sectional unit and the time dimensions, respectively.

In the case of the cross-sectional dependence (CD) with different integrations of the series, the long-term link across the variables will be examined using the CS-ARDL approach, which was introduced by A. Chudik *et al* (2016). It should be noted that the CS-ARDL approach has some superior traits over its counterparts. First, it considers the presence of cross-sectional dependence and slope heterogeneity in panel data. To that end, it facilitates the CD both in the short and in the long run. In addition, this approach captures the long-term effects, which are estimated by controlling the unobservable factors associated with the baseline specification. Second, it is a dynamic approach in which the lagged-dependent variable enters as the weak exogenous regressor under the error-correction mechanism (Sohag, Chukavina & Samargandi, 2021). Accordingly, the CS-ARDL representation of the baseline specification reads as follows:

$$\Delta LU_{it} = \mu_i + \phi_i (LU_{it-1} - \beta_i X_{it-1} - \gamma_{1i} \overline{LU}_{t-1} - \gamma_{2i} \overline{X}_{t-1}) + \sum_{j=1}^{p-1} \theta_{ij} \Delta LU_{it-j} + \sum_{j=0}^{q-1} \vartheta_{ij} \Delta X_{it-j} + \sigma_{1i} \Delta \overline{LU}_t + \sigma_{2i} \Delta \overline{X}_t + \varepsilon_{it} \tag{2}$$

where ΔLU_{it} is the dependent variable, whereas X_{it} represents the vector of the independent variables in which LD and LY are involved. The long-term expected

values of both the dependent and the independent variables are denoted by \overline{LU}_{t-1} and \overline{X}_{t-1} , whereas the short-term value for the dependent variable and the set of the independent variables are denoted by ΔLU_{it-j} and ΔX_{it-j} , respectively. ΔLU_t and ΔX_t represent the expected values in the short run; β_i represents the estimated coefficient of the independent variables, θ_{ij} represents the short-term coefficient of the dependent variable; ϑ_{ij} denotes the short-term coefficients of the independent variables. Finally, σ_{1i} and σ_{2i} denote the coefficients of the expected values and ε_{it} denotes the conventional error term.

The empirical analysis in the present study will be augmented by performing the recently developed panel Granger noncausality approach. A. Juodis *et al* (2021) tailored a new method in testing for Granger noncausality not only in the presence of cross-sectional dependence, but also in the presence of either homogeneity or heterogeneity. Moreover, the test cannot suffer size distortions even if the time dimension (T) is smaller than the cross-sectional dimensions (N). In other words, it has the powerful advantage in the presence of the large N and the small T, and can produce the results that are more efficient when compared to the counterparts, namely to E. L. Dumitrescu and C. Hurlin (2012) (Xiao, Karavias, Juodis, Sarafidis & Ditzén, 2023). By setting linear restriction on the Granger causation parameters, A. Juodis *et al* (2021) assumed the following linear dynamic panel data model:

$$y_{i,t} = z'_{i,t} \theta_i + x'_{i,t} \beta_i + \varepsilon_{i,t} \tag{3}$$

where $z_{i,t} = (1, y_{i,t-1}, \dots, y_{i,t-p})'$, $x_{i,t} = (x_{i,t-1}, \dots, x_{i,t-p})'$, $\theta_i = (\theta_{i,t-1}, \dots, \theta_{i,t-p})'$ and $\beta_i = (\beta_{1i}, \dots, \beta_{pi})'$.

In addition, $i=1, \dots, N$ denotes the cross-sectional unit, $t=1, \dots, T$ denotes the time dimension, whereas $p=1, \dots, P$ denotes the lag length for the heterogeneous autoregressive coefficient. The null hypothesis of $x_{i,t}$ does not Granger-cause of $y_{i,t}$ by the pooled least squares estimator of β , which A. Juodis *et al* (2021) develop in the following form:

$$\hat{\beta} = \left(\sum_{i=1}^N X_i' M_{Z_i} X_i \right)^{-1} \left(\sum_{i=1}^N X_i' M_{Z_i} y_i \right) \tag{4}$$

where $M_{Z_i} = I_T - Z_i (Z_i' Z_i)^{-1} Z_i'$. According to A. Juodis *et al* (2021) the pooled least squares estimator of β suffers a Nickell bias, so A. Juodis *et al* (2021) suggest the half-panel jackknife (HPJ) method pioneered by G. Dhaene and K. Jochmans (2015) to eliminate the bias. Thus, A. Juodis *et al* (2021) derived the following bias-corrected version of the Wald test for Granger noncausality in the following form (Xiao *et al*, 2023):

$$\widehat{W}_{HPJ} = NT \tilde{\beta}' (\hat{J}^{-1} \widehat{V} \hat{J}^{-1})^{-1} \tilde{\beta} \tag{5}$$

where $\hat{J} = \frac{1}{NT} \sum_{i=1}^N X_i' M_{Z_i} X_i$ and $\tilde{\beta}$ is the HPJ estimator that removes the bias associated with the pooled estimator under homogeneity restriction. Accordingly, the discussion on the empirical results will be documented in Section 5 below through the above-mentioned methodological arguments.

EMPIRICAL RESULTS AND DISCUSSION

The first step of this empirical investigation commences with checking the presence of cross-country dependence and slope homogeneity. Since

the countries in the present sample have almost analogous economic and political structures, any shocks (economic, commercial, financial, political, etc.) that arise in one country may potentially influence the rest of the countries in the sample. Thus, it is crucial to check for the presence of cross-country dependency in order to conduct efficient analyses in further steps. Pioneered by M. H. Pesaran (2004), the left-hand segment of Table 3 reports the results of the CD and CD_{LM} tests with respect to each specification. The null hypothesis of cross-sectional independence is firmly rejected by each test since the computed test statistics are significant at the 1% significance level. On the other hand, the homogeneity of slope parameters in a linear model is examined by the homogeneity tests introduced by M. H. Pesaran and T. Yamagata (2008). In this respect, the right-hand segment of Table 3 reports the results of the homogeneity tests, which on their part clearly highlight the rejection of the null hypothesis of slope homogeneity to the extent that the corresponding test statistics exceed the critical values at the 1% significance level.

Before investigating the presence of the long-term interplay across the variables, it is crucial to check for the integration order of the variables so that, in the presence of the unit root, further analyses may produce spurious results. In this respect, various types of panel unit root tests were performed so as to check for the integration order of the considered variables. Depending on the existence of cross-sectional dependence and homogeneity/heterogeneity conditions, those tests are classified as the first-generation and second-generation panel unit root tests. Table 4 reports the results of the panel unit root tests. It should be noted that the underlying

Table 3 CD tests and slope homogeneity

Cross-Sectional Dependency Tests			Homogeneity Tests		
	Test statistics	p-value		Test statistics	p-value
CD Test	21.705	0.000*	$\tilde{\Delta}$ Test	20.691	0.000*
CD_{LM} Test	54.218	0.000*	$\tilde{\Delta}$ adj Test	22.493	0.000*

Note: *denotes the significance level at 1%.

Source: Authors

assumptions and the test statistics of each test might differ as well. The test pioneered by A. Levin, F.-C. Lin and C. J. Chu (hereinafter referred to as the LLC) (2002) is appropriate under the homogeneity of conditions, whereas the tests suggested by G. S. Maddala and S. Wu (1999) and K. S. Im, M. H. Pesaran & Y. Shin (hereinafter referred to as the IPS) (2003) are more appropriate in the case of heterogeneity in panel data. Moreover, the LLC test is based on t-statistics, whereas the IPS and Fisher-type tests (the ADF and PP tests, respectively) are based on the W-statistics and Fisher χ^2 -statistics (Chakraborty, 2023). To this end, the results of the first-generation tests produce consistent results. Except for the series of LD, the series of LU and LY become stationary by the first differencing.

Due to the aforementioned shortcomings associated with the issues of cross-sectional dependence and slope heterogeneity, the first-generation tests might produce spurious inferences, in which context, the stationarity of the variables is also checked by employing the so-called second-generation test pioneered by M. H. Pesaran (2007). Differently from the first-generation tests, the consideration of the cross-sectional dependence and heterogeneity issues is the basic characteristic of the second-generation-type tests. In line with the IPS test, M. H. Pesaran (2007) developed the unit root test suitable in the presence of cross-sectional dependence and heterogeneity. In order to wipe out cross-sectional dependence, M. H. Pesaran (2007) derived the cross-sectional augmented version of the IPS (CIPS) test,

in which the common factor approach was used to eliminate CD. Accordingly, the results of the CIPS test are presented in the last column of Table 4. The results of the CIPS test endorse the results obtained by the implementation of the first-generation unit root tests, in which context, the series of defense burden is integrated at the level, whereas the series of the unemployment rate and the GDP *per capita* become stationary after the first differencing. In other words, I (1). Thus, the mixed order of the integration of the variables in the presence of CD and heterogeneity makes it feasible to apply the CS-ARDL technique to investigate the long-term relationship.

In the case of CD and heterogeneity, on the one hand, and the mix order of integration among the variables, the cointegration relationship is examined employing the CS-ARDL approach. Developed by A. Chudik *et al* (2016), this approach can eliminate the CD bias for different time horizons. Throughout the baseline specification, the CD bias is eliminated in the short run (Model 1), in the long run (Model 2), and jointly (in the short and long run) in Model 3. In other words, Model 1 eliminates the CD bias in the short-term estimators, whereas Model 2 eliminates the CD bias in the long-term estimators. Furthermore, Model 3 eliminates the CD bias in either estimator with respect to each time horizon. The sign of the error-correction term (EC_{t-1}) is negative and statistically significant in each model. Thus, the long-term interplay tends to exist between unemployment, defense burden, and the GDP *per capita*. However, the speed of adjustment to the long-term equilibrium path is 12.4% per year to

Table 4 The panel unit root tests

Variables	LLC	IPS	ADF	PP	CIPS	Outcome
LU	0.6869	0.3220	0.8516	-0.4035	-1.395	
Δ LU	-8.9237*	-8.8599*	8.8645*	31.1553*	-4.746*	I (1)
LD	-3.9234*	-3.2985*	2.8519*	2.0382**	-1.687***	
Δ LD	-7.8566*	-9.1250*	11.2760*	33.8880*	-4.614*	I (0)
LY	0.0259	2.4402	-1.5807	0.2783	-1.365	
Δ LY	-6.6948*	-6.7413*	7.8646*	14.9250*	-3.557*	I (1)

Note: *** denotes the significance level at 1%. The critical values for the CIPS test at 1%, 5% and 10% significance levels are -2.93, -2.76, and -2.66, respectively.

Source: Authors

the extent that is relatively lower with respect to the other models. After the elimination of the CD bias, the speed of adjustment to the long-term equilibrium is 22.8% in Model 2, and 22.6% in Model 3.

The detection of the long-term interplay across the variables leads to checking for potential causality relationships as well. Differently from the standard M. H. Pesaran (1969) causality test, in which the CD and heterogeneity issues are ignored, the A. Juodis *et al* (2021) panel Granger noncausality test was used, the results of the test being accounted for in Table 6 and showing the presence of unidirectional causality from defense burden to unemployment, with respect to which, the null hypothesis reading that LD does not Granger-cause LU is rejected at the 10% significance level. Moreover, there is also unidirectional causality from the GDP *per capita* to unemployment to the extent

validating the presence of Okun’s Law. Thus, the null hypothesis reading that LY does not Granger-cause LU is clearly rejected at the 5% significance level. Unidirectional causality is also perceived between the GDP *per capita* and unemployment, in which context, the null hypothesis reading that LY does not Granger-cause LU is rejected at the 5% significance level.

Overall, the results support those documented by P. J. Dunne and D. Watson (2000), J. Yıldırım and S. Sezgin (2003) and L. Qiong and H. Junhua (2015). Furthermore, in the sense that the presence of the causality relationship between defense burden and the unemployment rate, the results of the present study also tend to support the results reported by J.- H. Tang *et al* (2009), M. Zhong *et al* (2015), and Anoruo *et al* (2018). As argued by M. Sanso-Navarra and M. Vera-Cabello (2015), a possible explanation

Table 5 The CS-ARDL model results

	CD in SR (Model 1)	CD in LR (Model 2)	CD in SR & LR (Model 3)
EC_{t-1}	-0.1242 (0.0630)**	-0.2289 (0.0963)**	-0.2263 (0.1133)**
Long-term coefficients			
LD_{t-1}	0.3624 (0.1042)*	0.3986 (0.0733)*	0.4620 (0.0474)*
LY_{t-1}	-0.0430 (0.0611)	-0.5773 (0.1109)*	-0.1195 (0.1135)
Short-term coefficients			
ΔLD	-0.0844 (0.0796)	0.0111 (0.0456)	-0.0253 (0.0698)
ΔLY	-0.5180 (0.2170)**	-0.8051 (0.2700)*	-0.4919 (0.2647)***
Constant	0.3876 (0.1807)**	-0.8992 (0.3797)**	-2.1973 (1.1228)**

Note: *** denotes the significance level at 1%. The standard errors are given in parentheses.

Source: Authors

Table 6 The panel Granger noncausality test results

Direction of causality	HPJ Wald Test	Outcome
LD → LU	3.4108 (0.0648)***	H ₀ is rejected
LU → LD	0.4915 (0.4833)	H ₀ is not rejected
LY → LU	4.4175 (0.0356)**	H ₀ is rejected
LU → LY	2.4955 (0.1142)	H ₀ is not rejected
LD → LY	2.0278 (0.1544)	H ₀ is not rejected

Note: ** and *** denote the significance levels at 5% and 10%. The corresponding p-values are given in parentheses.

Source: Authors

could be that, rather than being made on capital-intensive, defense expenditures in those countries are inclined more on labor-intensive to the extent that forced conscription or mandatory military service is in force even though the duration of those services depends on respective legislations and the situation those countries are being faced with.³ Thus, except for Russia, which is one of the major arms producers and exporters in the world, the allocation of the budgetary sources could be channelized more to a personnel expenditure rather than the provision of arms products with cutting-edge technologies. Therefore, the anticipated outcome regarding the diffusion of technology to the civilian sector and the associated increase in labor productivity and employment may not be realized.

CONCLUSION

The present study focuses on the long-term dynamic link between defense burden and unemployment for the selected CIS countries where intensive conflicts have broadly been observed in recent years under the shadow of the warfare between Russia and Ukraine. Furthermore, the interplay between defense burden and unemployment were investigated in a novel empirical approach. In this respect, the long-term dynamic link was examined using the CS-ARDL approach that has never been implemented before in the empirical analyses specifically addressing the nexus between defense expenditures and employment/unemployment. The results obtained from all the three versions of the CS-ARDL model have confirmed the existence of the positive dynamic link between defense burden and unemployment, meaning that increasing defense spending tends to accelerate the unemployment rate in those countries. The panel Granger noncausality test by A. Juodis *et al* (2021) has also verified these results.

In line with the results, the characteristics of defense expenditures in those countries could be prone to more labor-intensive rather than capital-intensive, except for Russia, which is one of the leading arms producers and exporters in the global context

and with the potential to invest more in cutting-edge technologies in arms production. Therefore, anticipated productivity gains may not be realized without the diffusion of military technology to the civilian sectors. Since forced conscription is in force in all the countries included in the sample, it is quite plausible that the countries tend to channel their budgetary sources to a personnel expenditure. In order to generate additional employment opportunities associated with productivity rises, governments should allocate defense expenditures in a capital-intensive manner so as to enable the production of cutting-edge technology arms in the country. Moreover, governments should also reinforce cooperation with civil or private sector companies for the provision of defense goods. Beside the diffusion of technology in the country, the provision of those goods would also strain the external dependence of the military sector in general. Thus, the pressure on governments' budgets and the balance of payments would be mitigated as well. Beyond the characteristics of defense expenditures in those countries, governments should channel the budgetary sources to the productive fields that trigger private investments, which are likely crowded out by the defense expenditures of the governments. In line with the results highlighted in the present study, the governments in those countries should gradually constrain defense expenditure in the long run in order to channel the budgetary sources to productive fields.

Despite those major findings and policy implications, this paper has some limitations that are worth mentioning in conducting future studies in this field. The basic limitation of this empirical endeavor hinges on the sample countries. Due to the limitations of the available data for some countries (i.e. for Tajikistan and Uzbekistan), the empirical analysis was limited to those nine post-Soviet countries. Moreover, the three Baltic countries (Estonia, Latvia and Lithuania) were excluded from the sample since they are involved in different economic and political blocs by having integrated with the EU and NATO. Therefore, further empirical analyses could be strengthened by including those countries as well. In addition, the outbreak of the war between the Russian Federation and Ukraine has not only influenced both countries, but their

neighboring countries and European countries as well. In this respect, the majority of the European countries have allocated more budgetary resources to their respective national defense since the outbreak of said war. Thus, future empirical studies could be extended involving those European countries, too. Furthermore, with the availability of proper data for empirical analysis, future studies could be carried out taking into consideration the presence of structural breaks in unveiling the dynamic interplay between militarization and unemployment, together with the other macroeconomic indicators thought to be influenced by changes in defense expenditures.

ENDNOTES

- 1 Currently, the CIS consist of nine states and one associated state, namely Turkmenistan. Due to the data availability issue, Tajikistan and Uzbekistan have not been included in the empirical analyses. Even though Moldova and Ukraine have been ceased the CIS protocol as the founding members, they were included in the empirical analyses instead of Tajikistan and Uzbekistan. For the current discussion on the membership status of the countries, see: https://en.wikipedia.org/wiki/Commonwealth_of_Independent_States.
- 2 Since Estonia, Latvia and Lithuania are the current members of the EU and NATO, they are excluded from the empirical analyses because they are involved in a different political and military bloc.
- 3 To learn where conscription is currently in force with respect to the sex and duration for the countries included in the sample, go to <https://worldpopulationreview.com/country-rankings/countries-with-mandatory-military-service>.

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ISPITIVANJE DINAMIČNE VEZE IZDVAJANJA ZA FINANSIRANJE ODBRANE I NEZAPOSLENOSTI: DOKAZ IZ ZEMALJA BIVŠIH SOVJETSKIH REPUBLIKA

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Istočni blok se raspao do kraja perioda Hladnog rata i obrazovan je novi svetski poredak. Proces brze liberalizacije je ubrzao prelaz na privredu zasnovanu na slobodnom tržištu. U tom prelaznom periodu, međutim, mnoge političke tenzije koje su tinjale između nekih zemalja su se takođe pretočile u sukobe i ratove. Iz tog razloga, zemlje opredeljuju svoje oskudne resurse za potrebe nacionalne bezbednosti, pre nego za svoje razvojne ciljeve, postepeno povećavajući svoja izdvajanja za potrebe finansiranja odbrane. U skladu s tim, ova studija ima za cilj da ispita postojanje dinamične veze izdvajanja za finansiranje odbrane i nezaposlenosti u odabranih devet zemalja bivših sovjetskih republika koje su nastale nakon kraha Sovjetskog Saveza. Studija počiva na skupu godišnjih podataka koji se odnose na devet zemalja bivših sovjetskih republika u periodu između 1996. i 2021. godine. Rezultati studije su pokazali da izdvajanja za finansiranje odbrane ni u kom slučaju kratkoročno ne utiču na nezaposlenost kao i da imaju pozitivan učinak dugoročno gledano.

Ključne reči: teret odbrane, nezaposlenost, zemlje bivše sovjetske republike, panel podaci

JEL Classification: C33, F51, H56, P20

APPENDIX

A. 1. The list of the post-Soviet Union countries

Azerbaijan	Georgia	Moldova
Armenia	Kazakhstan	Russian Federation
Belarus	Kyrgyzstan	Ukraine

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DOES FINANCIAL TECHNOLOGY REDUCE INFLATION? LESSONS LEARNT FROM SUMATRA

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The purpose of this paper is to investigate the impact of financial technology (Fintech) on the inflation rate. The contribution reflects in the creation of a new index for Fintech, involving several indicators using principal component analysis. The data utilized belong to a panel dataset pertaining to the 10 provinces of the island of Sumatra, Indonesia, spanning from January 2020 to June 2023. The pooled mean group (PMG) estimation method is employed in order to test the relationship between Fintech and the inflation rate. The research findings of the study indicate that Fintech is capable of reducing inflation in the long run. Therefore, this research study implies the necessity to intensify the use of Fintech for the purpose of creating an efficient economic environment and promoting economic stability.

Keywords: financial technology, inflation, Sumatra, pooled mean group

JEL Classification: E31, G23

INTRODUCTION

Digitalization has shaped a new habitus in the economy, altering the structure and patterns of interaction among economic players, including households and businesses. The intensity of digitalization has become more pronounced following the COVID-19 pandemic. The social activity restrictions during the COVID-19 pandemic have necessitated societal adaptation to the interaction

patterns that minimize physical contact. In response to this, various innovation disruptions have emerged based on leveraging information technology to support all societal activities, such as commercial activities, teaching and learning, as well as office-related tasks. Furthermore, the adoption of digital technology is a strategic effort to modify business processes so as to accommodate evolving business and market demands (Adeyinka, 2023).

Financial technology (Fintech) represents the form of disruptive innovation that amalgamates technology and financial services so as to support more modern business models (Chang, Baudier, Zhang, Xu, Zhang & Arami, 2020). Fintech serves as a reflection

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of the digitization progress within the financial services industry based on information technology (Puschmann, 2017). Disruptive innovations such as Fintech have disrupted conventional models in the financial services industry, impacting the industry's structure, intermediary technologies, and marketing models (Beck & Smits, 2018; Al nawayseh, 2020; Alt, Machkour & Abriane, 2020). Furthermore, the presence of Fintech has become an alluring force due to a shift in societal preferences towards online financial services, utilizing the Internet media for digital access. In turn, the incorporation of technology in the financial services industry is becoming a part of the innovation diffusion process aiming to offer transactional convenience to the entire community.

Fintech has the potential to offer various solutions that traditional financial institutions have thus far been unable to provide. Fintech plays an important role in reaching diverse groups of people, particularly the unbanked, by providing them with access to finance. Moreover, the advantages of the Fintech business model highlight cost efficiencies in financial services, the enhanced accessibility and quality of financial services, and the establishment of a more diverse financial landscape (Jagtiani & Lemieux, 2018). Therefore, Fintech can contribute to economic efficiency through reduced transaction costs and the improved allocation of capital and loans.

The cost reduction resulting from the use of Fintech is expected to lead to increased efficiency in the output supply within the economy, thereby exerting downward pressure on inflationary conditions, which assertion is supported by the previous studies examining the impact of Fintech adoption on inflation. The findings of Y. B. Romdhane, S. Kammoun and S. Loukil (2023) consistently demonstrate the fact that Fintech plays a role in reducing inflation in several Asian countries. This study implies that the government should prioritize the enhancing of the digital infrastructure in order to accelerate Fintech development. In the context of Indonesia, R. P. Hariadhy, A. S. Danutirta and M. Lubis (2022) investigated the relationship between the development of Fintech and the monthly inflation rate, their findings indicating that the development of

Fintech correlated negatively with monthly inflation in Indonesia.

Spatially, the regions in Sumatra Island, Indonesia, hold a significant potential for the development of financial technology. This potential can be identified through several indicators. Firstly, based on data obtained from East Ventures (EV), the digital competitiveness index shows that the index increased for all the provinces in Sumatra in 2022 compared to the previous year. Notably, Northern Sumatra and the Riau Islands rank among the top 10 provinces in Indonesia with the highest digital competitiveness and literacy indices. Secondly, according to the latest data obtained from the Financial Services Authority (OJK) spanning from April 2022 to April 2023, the cumulative value of the loans disbursed by Fintech lending indicates that Sumatra's provinces collectively contributed nearly 50% (49.45%) to the total loan disbursement for the non-Java region.

The development of Fintech in Sumatra Island provides a potential intervention to address inflation stability amidst the increasing inflation rate in various regions in Sumatra Island. However, the influence of Fintech on inflation needs to be further identified. Several previous studies have confirmed the role of Fintech in stabilizing inflation rates (Romdhane *et al*, 2023; Mittal, Kathuria, Saini, Dhingra & Yadav, 2023). However, there are other studies that present contrasting findings, suggesting that the presence of Fintech may worsen inflation rates. The study by A. Anggraini and G. Agustin (2022) found that an increase in credit card transactions would support inflation through the intervening variable of money velocity. Furthermore, the findings of B. D. Saraswati, G. Maski, D. Kaluge and R. K. Sakti (2020) also provide the evidence that the development of Fintech will affect the effectiveness of monetary policies in Indonesia, particularly in maintaining long-term inflation stability.

There is a fact that the inflation trends in the provinces of Sumatra continue to rise, which is coupled with the inconsistent results regarding the impact of Fintech on the inflation rate. This study aims to investigate whether Fintech can or cannot play a role in reducing

the inflation rate in Sumatra. To the best of the author's knowledge, no previous studies have been conducted on Fintech and inflation rates, specifically not so for the provinces of Sumatra. Prior studies have only encompassed broader regions, such as Indonesia (Narayan & Sahminan, 2018; Saraswati *et al*, 2020), Asia (Romdhane *et al*, 2023), the MENA zone countries (Kammoun, Loukil & Loukil, 2020), and 30 countries (Mumtaz & Smith, 2020). Therefore, this study seeks to provide additional references and fill the research gap by examining Fintech studies on inflation at the regional level. The data used in this study consist of the panel data obtained from the provinces in Sumatra Island for the period from January 2021 to June 2023. Subsequently, the hypothesis tested in this study is as follows:

H1: Fintech has a significant statistical impact on inflation in Sumatra Island.

The pooled mean group (PMG) method will be used to estimate and test the hypothesis in this study. The remainder of this research is structured into a few more sections. The second section provides a summary of the empirical findings from the existing literature. The third section explains the research methodology and data. The fourth section presents the empirical results and discussions, while the conclusions are presented in the fifth section.

REVIEW OF THE EMPIRICAL LITERATURE

In the digital era, the role of the Internet and information technology has become a primary focus in inflation analysis in a lot of countries. M. N. Çoban (2022) notes an interesting phenomenon that, with the increasing penetration of the Internet, the inflation rates in the ASEAN-5 countries show a declining trend. This observation aligns with the findings of M. H. Yi and C. Choi (2005), who state that increased investment in the Internet infrastructure may help reduce inflation. The underlying rationale is that the rapid development of the Internet has the potential to alter the traditional correlation between money and inflation.

Furthermore, A. F. Priyono (2016) asserts that the Internet should be leveraged not only for communication, but also for research and development and cost efficiency as well. In other words, the utilization of the Internet that enhances cost efficiency is expected to have a deflationary effect on commodity prices. Similarly, K. Charbonneau, A. Evans, S. Sarker and L. Suchanek (2017) also document the deflationary effects of digitization in European countries, although they suggest that such implications should be addressed by policymakers.

The digitization wave and an increased penetration of the Internet particularly in the financial sector have catalyzed the rapid evolution of Fintech. Fintech has transformed the financial industry, particularly in the domains of loan offerings, payments, investments, and various financial services. Through its efficiency and accessibility, Fintech has the potential to influence monetary dynamics and ultimately impact inflation rates. In response to these changes, M. Z. Mumtaz and Z. A. Smith (2020) examined the role of Fintech in the transmission mechanism of the monetary policy and found that the development of Fintech did not alter the velocity of money and the income multiplier. However, mobile and digital technologies, the cryptocurrencies like Litecoin and Ethereum included, emerge as the strong predictors of money demand. Their research also indicates that the monetary policy has a significant effect in post-Fintech implementation, with higher monetary policy rates increasing borrowing costs and broadening the output gap.

Meanwhile, S. W. Narayan and S. Sahminan (2018) explored the influence of Fintech on Indonesia's macroeconomy, specifically so on its potential to curb inflation and strengthen the rupiah against the US dollar. Another research study carried out by Y. B. Romdhane *et al* (2023) sought to clarify the impact of Fintech on Asian economies, with a specific focus on the two pivotal indicators — namely inflation and unemployment — during the period spanning from 2011 to 2017. This investigation reveals a robust and positive correlation between the progress of financial technology and a reduction in both inflation and unemployment, particularly when such technological

advancements are actively embraced. Digital finance essentially emerges as a newfound catalyst in propelling economic development.

Additionally, the study conducted by B. D. Saraswati *et al* (2020) investigated the impact of financial inclusion and Fintech on the efficacy of the monetary policy, specifically through the interest rate channel considering the cost of capital and substitution effects. Their empirical findings reveal that financial inclusion influences the inflation rate, serving as a proxy for the effectiveness of the monetary policy, both in the short run and in the long run. Conversely, Fintech exerts an influence on inflation only in the short run. Similarly, R. Mittal *et al* (2023) explored the interplay between financial inclusion, Fintech, and the effectiveness of the monetary policy in India, only to identify in their study a positive association between financial inclusion, Fintech, and inflation as a proxy for the efficacy of the monetary policy, both in the short run and in the long run. However, the relationship between Fintech and inflation turns to be negative when the cost of the capital effect is integrated in the model.

B. D. Saraswati, G. Maski, D. Kaluge and R. K. Sakti (2022) studied the impact of Fintech on household consumption. Their empirical findings indicate that Fintech has a positive impact on household consumption both in the short run and in the long run. These findings suggest that, while Fintech can drive economic growth, it may also encourage higher consumption, which could potentially lead to an increase in inflation. Additionally, D. S. Puspita, B. D. Saraswati and A. T. Pertiwi (2023) examined the influence of e-money on inflation in Indonesia and found that e-money had a negative effect on the inflation rate, indicating that e-money was capable of controlling inflation. Therefore, a cashless society policy is an appropriate measure to control inflation rates.

The current research confirms the fact that Fintech does play a crucial role in controlling inflation, which indicates that the Fintech revolution, with all its innovations and efficiencies, can influence inflation dynamics differently from traditional factors.

According to the previously reviewed literature, many researchers have delved into the determinants of inflation, such as the money supply level (Long, Hien & Ngoc, 2021; Islam, 2022), interest rates (Mishkin, 1992; Booth & Ciner, 2001), exchange rates (Pham, 2019; Valogo, Duodu, Yusuf & Baidoo, 2023), oil prices (Köse & Ünal, 2021; Zakaria, Khiam & Mahmood, 2021), and government spending (Kandil, 2005; Zhang, 2022). However, despite numerous traditional factors influencing inflation, the role of Fintech in this context seems to have received insufficient attention.

With its specific focus on Sumatra Island, this study aims to fill the gap in the literature by investigating how Fintech influences inflation in the region. Understanding the contribution of Fintech to inflation dynamics is expected to provide new insights for policymakers and relevant stakeholders.

RESEARCH METHOD AND DATA

Data and variables

Over the past seven years, there has been a notable increase in the number of the registered Fintech companies with the Indonesian Fintech Association (AFTECH), as is shown in Figure 1. Concurrently, Figure 2 shows that the inflation rates across nearly all the regions of Sumatra have consistently surpassed the national average, simultaneously having shown a rising trend over the last three years. These trends highlight the significance of examining the economic dynamics and regional stability in Sumatra.

The data analyzed in this research study consist of the secondary time series data covering the monthly period for the 10 provinces of Sumatra Island, namely Bengkulu, Jambi, Bangka Belitung Islands, Riau Islands, Lampung, Aceh, Riau, Western Sumatra, Southern Sumatra, and Northern Sumatra from January 2020 to June 2023. The data were obtained from various government agencies, including Statistics Indonesia, Bank Indonesia, and the Financial Services Authority.

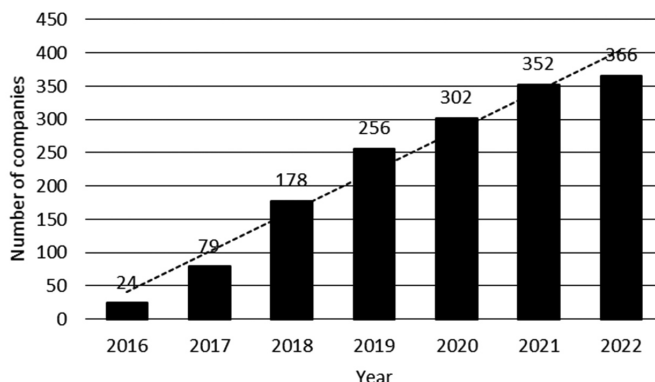


Figure 1 The number of the Fintech companies in Indonesia from 2016 to 2022

Source: Authors, based on AFTECH, 2023

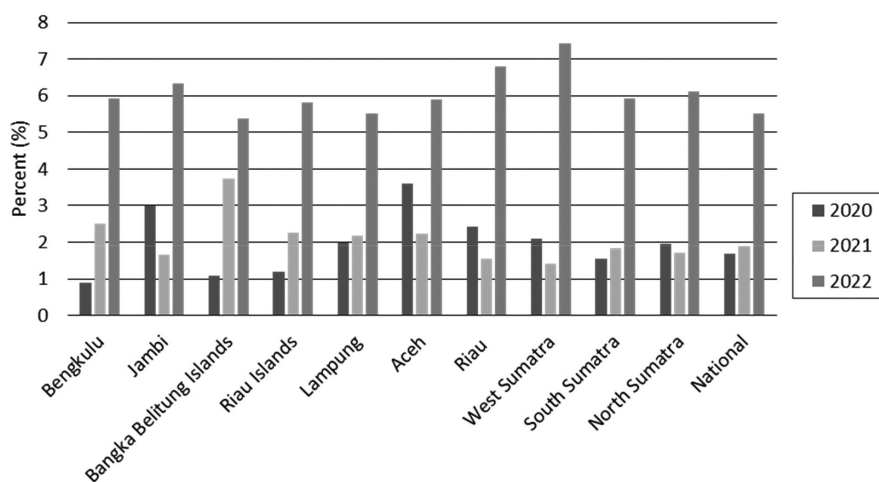


Figure 2 The inflation rate trends of the provinces in Sumatra from 2020 to 2022

Source: Authors

To examine the impact of Fintech on inflation, the consumer price index (CPI) was employed as the dependent variable. Given the limitations of global availability for the Fintech index data, Fintech was proxied in this study by the financial inclusion index formed from the four variables reflecting the activities of the financial technology use. These variables include ATM transaction value, credit card transaction value, the number of electronic money cards, and the cumulative distribution of loans. The indicators of the

Fintech index can be observed in Table 1 in detail. The selection of the Fintech index components was based on data availability and referred to the variables for the index construction by G. Feng, W. Jingyi, W. Fang, K. Tao, Z. Xun and C. Zhiyun (2019). Furthermore, the Fintech index used in this study was constructed using Principal Component Analysis (PCA), the method previously applied in the studies by C.-C. Lee, X. Li, C.-H. Yu and J. Zhao (2021). In this study, PCA was utilized so as to reduce the dimensionality

of the data from the correlated variables through linear transformation, obtaining a single measure. The resulting index can depict the overall variability among the correlated Fintech components (Ahamed & Mallick, 2019; Lee *et al*, 2021).

In an effort to control the external variables that may influence inflation, the four control variables - the exchange rate (ER); the interest rate (IR); money supply (MS); and the gross regional domestic product (GRDP) were introduced in order to avoid simultaneous bias. The current studies have confirmed that inflation is influenced by the exchange rate (Valogo *et al*, 2023), the interest rate (Nchor & Darkwah, 2015), money supply (Long *et al*, 2021), and the GDP (Koulakiotis, Lyroudi & Papasyriopoulos, 2012). Table 1 explains the operationalization of the variables used in this study.

Model specification

This study aims to identify the influence of Fintech on the inflation rate in Sumatra Island region. The model employed in this study adopts a dynamic approach, taking into consideration the factors of inertia or adjustments that occur as the community needs to adapt to developments in financial technology. Consequently, the impact of Fintech cannot directly affect the inflation rate due to the presence of the lag factors. The model utilized in this study reads as follows:

$$\text{Log_INF}_{it} = \beta_0 \text{Log_INF}_{it-1} + \beta_1 \text{FTI}_{it} + \beta_2 \text{Log_ER}_{it} + \beta_3 \text{IR}_{it} + \beta_4 \text{Log_MS}_{it} + \beta_5 \text{Log_GRDP}_{it} + \varepsilon_{it} \quad (1)$$

where INF_{it} represents the inflation rate proxied by the consumer price index, FTI_{it} depicts the Fintech index, ER_{it} , IR_{it} , MS_{it} , and GRDP_{it} serve as the control variables for the exchange rate, the policy interest rate of the Bank Indonesia, money supply, and the gross

Table 1 The operationalization of variables

Variable	Measurement	Definition	Source
Consumer price index (INF)	Index	The consumer price index in a certain region.	Statistics Indonesia
Indicators of Fintech			
Transaction value at ATMs (ATM)	Million Rupiah	The total transaction value on ATM cards includes both cash withdrawal transactions and/or fund transfers.	Bank Indonesia
The value of credit card transactions (CREDIT)	Million Rupiah	The total transaction value on credit cards includes both spending transactions and/or cash withdrawals.	Bank Indonesia
Electronic money (EM)	Unit	The number of the electronic money cards owned both chip- and server-based.	Bank Indonesia
The accumulation of loan disbursement (LEND)	Million Rupiah	The cumulative disbursement of the loans distributed by the Fintech companies (peer-to-peer lending).	Financial Services Authority
Fintech index (FTI)	Index	The Fintech composite index	-
Control Variables			
Exchange rate (ER)	Indonesian Rupiah	The exchange rate of the US dollar against the Indonesian rupiah.	Bank Indonesia
Interest rate (IR)	Percentage	The interest rate policy level of the Bank Indonesia.	Bank Indonesia
Money supply (MS)	Billion Rupiah	The total of broad money M2.	Bank Indonesia
Gross regional domestic product (GRDP)	Billion Rupiah	The total value added of the goods and services produced from all economic activities in an area.	Statistics Indonesia

Source: Authors

regional domestic product, respectively, ε_{it} is the error term, β_1 is the main coefficient to examine the impact of the FTI on inflation, $i=1,\dots,N$ represents the cross-sectional units, and $t=1,\dots,T$ denotes the time periods.

Given the fact that our data consist of the 10 provinces and cover the period of 42 months, and the resulting total of 420 observations with the number of the time series dimensions being greater than the number of the cross-sectional dimensions, the GMM method is not suitable for the analysis made in this study and it may encounter problems related to autocorrelation in the residuals of the first-difference estimation (Roodman, 2009). Therefore, panel ARDL or pooled mean group (PMG) were employed for the analysis carried out herein. The PMG estimator developed by M. H. Pesaran, Y. Shin and R. P. Smith (1999) can examine the relationship among variables both in the short run and in the long run. This method permits for heterogeneity in the short-run coefficients, on the one hand, and homogeneity in the long run, on the other. The PMG estimator also exhibits integrated variables in I(0), I(1), or a combination. The ARDL model used in this study can be shown as follows:

$$\Delta y_{it} = \varphi(y_{i,t-1} - \delta_1 f_{i,t-1} - \delta_2 x_{i,t-1}) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q-1} \lambda'_{ij} \Delta f_{i,t-j} + \sum_{j=0}^{q-1} \lambda''_{ij} \Delta x_{i,t-j} + \omega_{it} \quad (2)$$

where y represents the dependent variable, namely inflation; f is Fintech; x represents the set of the control variables, namely the exchange rate, the interest rate, money supply, and the GRDP; φ shows the error correction term (ECT); δ_1 and δ_2 depict the long-run coefficient of Fintech and the control variables, respectively; λ , λ' , λ'' represent the short-run coefficients of lagged inflation, Fintech, and the control variables, respectively.

Before examining the PMG estimation, various preliminary tests were done. First, the cross-sectional dependence test was employed in order to scrutinize the existence of cross-sectional dependence within the panel data. Second, a unit-root test (i.e. the second-generation panel unit-root test) was done so as to assess the stationarity of the data, after which the presence of the long-term relationship among

the variables was investigated using the Westerlund cointegration test. Ultimately, the causality test was conducted in order to identify the causal relationship among the variables. The diverse statistical tests performed in this study are likely to enhance the robustness of the empirical findings.

Fintech measurement

In this study, the PCA method was applied in order to construct the Fintech index. The PCA is a method employed for extracting information from large datasets and can alleviate multicollinearity within a model (Sun, Khan & Ren, 2023). Utilizing four indicators, this research study compiles the Fintech index with the resulting variables referred to as the FTI. This index can represent advancements in the financial sector as it captures information about each digital financial activity, laying the foundation of Fintech.

Table 2 Principal component analysis for the Fintech index

Components	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.014	2.352	0.754	0.754
Comp2	0.663	0.444	0.166	0.919
Comp3	0.219	0.114	0.055	0.974
Comp4	0.104		0.026	1.000
Variables	Comp1	Comp2	Comp3	Comp4
Log_ATM	0.533	-0.317	-0.321	0.716
Log_CREDIT	0.499	-0.460	0.683	-0.269
Log_EM	0.541	0.103	-0.567	-0.613
Log_LEND	0.417	0.823	0.330	0.202

Source: Authors

Table 2 accounts for the results of the principal component analysis for the Fintech index (FTI) based on the four financial technology indicators. The findings reveal that the eigenvalue of the first component is 3.014, progressively decreasing to the fourth component, which shows the lowest change at 0.104. Furthermore, the first component explains

approximately 75.4% of the variation in the dependent variables, whereas the second, third, and fourth components contribute around 16.6%, 5.5%, and 2.6%, respectively. Clearly, the first principal component demonstrates the highest level of variation. Therefore, this study intends to utilize Comp1 as the Fintech indicator.

RESULTS AND DISCUSSION

Table 3 shows the descriptive statistics of all the variables used, displaying the figures prior to the logarithmic transformation, thus pointing to the fact that the average monthly inflation rate in the provinces of Sumatra is 0.818%, with the highest inflation reaching 8.55% and the lowest standing at -1.36%. These inflation statistics signal the importance of maintaining stability in Sumatra's inflation in

order to mitigate higher fluctuations. Furthermore, the Fintech variable used in this research study is constructed using the PCA to obtain the measure that can represent the variation of the Fintech-forming variables. The average Fintech index in the provinces of Sumatra is relatively low, at only 476×10^{-11} , and most provinces in Sumatra have negative Fintech indices throughout the observation period. Northern Sumatra has the highest Fintech index, reaching 3.189, whereas Bengkulu has the lowest Fintech index. Interestingly, the standard deviation values of inflation and the Fintech index are relatively low, indicating that the values of both variables are not broadly dispersed from their means.

The presented correlation matrix is used to identify the potential multicollinearity among the variables of this study. The results given in Table 4 reveal that inflation shows a significant negative correlation with Fintech, characterized by a relatively low correlation

Table 3 The descriptive statistics

	INF	FTI	ER	IR	MS	GRDP
Mean	0.8187143	476×10^{-11}	14683.43	4.184524	7379310	68965.57
Std. dev.	1.5444446	1.000004	520.2556	0.8248445	717274.8	65286.11
Min	-1.36	-2.6476	13662	3.5	6047999	38.77
Max	8.55	3.189422	16367	5.75	8528022	255479.4
Obs	420	420	420	420	420	420

Source: Authors

Table 4 The correlation matrix

Variables	Log_INF	FTI	Log_ER	IR	Log_MS	Log_GRDP
Log_INF	1					
FTI	-0.143*** (0.003)	1				
Log_ER	0.099** (0.043)	0.062 (0.205)	1			
IR	-0.145*** (0.003)	-0.004 (0.939)	0.258*** (0.000)	1		
Log_MS	0.049 (0.315)	0.408*** (0.000)	0.181*** (0.000)	-0.092* (0.060)	1	
Log_GRDP	0.163*** (0.001)	-0.189*** (0.000)	0.007 (0.887)	-0.003 (0.955)	0.037 (0.454)	1

Note: *, **, and *** indicate the significance levels at 10%, 5%, and 1%, respectively.

Source: Authors

coefficient. Furthermore, the interest rate is the only control variable negatively correlated with inflation. In contrast, the other control variables, such as the exchange rates, money supply, and the GRDP, show positive correlations with inflation. The relatively low magnitudes of the correlation coefficients for each variable indicate the absence of multicollinearity among the variables examined in this study (Gujarati & Porter, 2009). The finding underscores the reliability of the estimation results in this study.

The provinces in Sumatra are expected to have the potential to influence each other mutually due to regional cooperation among the provinces. Additionally, the efforts to stabilize inflation made by the Regional Inflation Control Team (TPID) in Sumatra may foster trade cooperation among the regions throughout Sumatra. Thus, testing for cross-sectional dependence (CSD) is essential to ascertain whether there is mutual influence among the regions in Sumatra. Neglecting this test may lead to unreliable estimations. The CSD test performed in this study employs the Breusch-Pagan Lagrange Multiplier (LM) test, which provides accurate estimations when $T > N$ (Breusch & Pagan, 1980). Therefore, the LM test is relevant for this study as the number of the time dimensions (42) is greater than the number of the cross-sectional dimensions (10). The CSD test results in Table 5 confirm that the null hypothesis reading that there are no CSD in the data should be rejected, showing that the p -value is significant, which on its part confirms the presence of CSD in this study. Then, it indicates that a shock in one region can probably influence another in this study. As a result, the presence of CSD required that second-generation tests, including the unit root test, the cointegration test, and long-term estimation should be employed.

Since the empirical study has confirmed the presence of cross-dependence among the variables, the first-generation panel unit root test, such as the Levin, Lin, and Chu (LLC) unit root test, is irrelevant to adopt as it is unable to produce unbiased estimation in the presence of cross-sectional dependence (Levin, Lin & Chu, 2002). Consequently, the study employs the

second-generation unit root test, namely the cross-sectionally augmented Im, Pesaran, and Shin (CIPS) approach, which takes into account the issue of cross-sectional dependence (Pesaran, 2007). The CIPS test examines the null hypothesis of nonstationary against the alternative hypothesis.

The results of the unit root test performed in this study are reported in Table 6. For the $I(0)$ order, the null hypothesis of nonstationary, inflation, Fintech, the exchange rate, the interest rate, and money supply is not accepted at the 1% significance level, whereas only the GDP fails to reject the null hypothesis. Furthermore, all the variables applied in this study reject the null hypothesis at the $I(1)$ order, thus indicating that all the variables are stationary. Therefore, the variables used in this study are stationary of mixed order at the level and the first difference, while no variable has proven to be stationary at the second difference, which on its part indicates that the variables unveil the cointegration relationship in the long run.

Subsequently, whether the variables employed show a long-term relationship or not was examined. The cointegration test developed by J. Westerlund (2007) was done in this study. The test is based on whether the Error Correction Term (ECT) equals zero for the panel Error Correction Model (ECM) or not. This cointegration test approach is considered to be more reliable compared to the traditional cointegration methods as it is more flexible and more adequate to accommodate specific short-term unit dynamics, trends, and slope parameters, as well as the presence of cross-sectional dependence (Persyn & Westerlund, 2008). The results of the cointegration test are presented in Table 7. These results indicate that the p -values for the error correction terms for the mean groups (G_t and G_a) and the panel (P_t and P_a) are significant. Therefore, the null hypothesis of no cointegration is rejected as such, suggesting that all the variables used in this study have a long-term relationship.

Table 5 The cross-sectional dependency test

Chi2	747.335
Prob.	0.000***

Note: *** indicates the significance level of 1%.

Source: Authors

Table 6 The stationarity test

Variables	Log_INF	FTI	Log_ER	IR	Log_MS	Log_GRDP
Level	-5.922***	-3.916***	2.610***	2.610***	2.610***	-2.159
First Difference	-6.190***	-6.053***	2.610***	2.610***	2.610***	-6.051***

Note: *** indicates the significance level of 1%.

Source: Authors

Table 7 The cointegration test

Statistics	Value	Z-value	P-value
G_t	-3.752	-3.670	0.000***
G_a	-21.649	-2.560	0.005***
P_t	-20.193	-11.739	0.000***
P_a	-49.005	-14.303	0.000***

Note: *** indicates the significance level of 1%.

Source: Authors

This study applies the panel ARDL or PMG approach to investigate the impact of Fintech on inflation both in the short run and in the long run. The Akaike Information Criterion (AIC) was utilized for the optimal lag selection, resulting in the selection of (3, 4, 4, 4, 4, 4) for the PMG. Table 8 displays the PMG estimation results for the panel of the provinces of Sumatra Island. The short-term estimation results show that the coefficient for lagged inflation (-1) is positive and significantly different from zero at the 5% and 10% levels, thus indicating the fact that the inflation of the previous period significantly contributes to an increase in the inflation of the current period. However, the positive coefficient estimate for Fintech is not statistically significant, which implies

Table 8 PMG estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long-term equation				
FTI	-1.172	0.155	-7.558	0.000***
IR	-0.260	0.061	-4.271	0.000***
Log_ER	-21.699	4.654	-4.663	0.000***
Log_MS	4.607	1.557	2.958	0.004***
Log_GRDP	3.276	1.460	2.245	0.026**
Short-term equation				
ECT (-1)	-0.509	0.218	-2.330	0.021**
D(Log_INF(-1))	-0.361	0.163	-2.218	0.028**
D(Log_INF(-2))	-0.106	0.149	-0.710	0.479
D(FTI)	0.296	0.273	1.085	0.280
D(FTI(-1))	0.258	0.370	0.697	0.487
D(FTI(-2))	0.017	0.299	0.055	0.956
D(FTI(-3))	-0.055	0.202	-0.274	0.784
D(IR)	0.923	0.331	2.786	0.006***
D(IR(-1))	-0.042	0.343	-0.124	0.902
D(IR(-2))	-1.998	0.527	-3.789	0.000***
D(IR(-3))	1.078	0.347	3.107	0.002***
D(Log_ER)	16.337	8.053	2.029	0.044**
D(Log_ER(-1))	7.726	9.266	0.834	0.406
D(Log_ER(-2))	11.429	5.845	1.955	0.052*
D(Log_ER(-3))	3.966	3.374	1.176	0.241
D(Log_MS)	-1.452	3.023	-0.480	0.632
D(Log_MS(-1))	12.428	4.875	2.549	0.012**
D(Log_MS(-2))	4.977	3.195	1.558	0.121
D(Log_MS(-3))	11.139	2.422	4.600	0.000***
D(Log_GRDP)	8.226	3.135	2.624	0.009***
D(Log_GRDP(-1))	-0.649	1.000	-0.649	0.517
D(Log_GRDP(-2))	0.294	2.040	0.144	0.885
D(Log_GRDP(-3))	-3.687	2.383	-1.547	0.124
C	-91.729	39.024	-2.351	0.019
S.D. dependent var	0.727	Mean dependent var		0.016
Akaike info criterion	1.373	S.E. of regression		0.425
Schwarz criterion	3.730	Sum squared resid		31.562
Hannan-Quinn criteria	2.304	Log likelihood		-43.321

Note: *, **, and *** indicate the significance levels of 10%, 5%, and 1%, respectively. The model selection method: AIC. The selected model: ARDL (3, 4, 4, 4, 4, 4).

Source: Authors

that digital financial transaction activities reflected in Fintech do not have a significant impact on the occurrence of inflation in the short run, a plausible explanation for this finding being that, in the short run, the imperfect information about and incomplete utilization of Fintech advancements by society may limit the impact on consumer consumption patterns and ultimately do not alter the inflation rate (Saraswati *et al*, 2020). Interestingly, most of the control variables have a significant positive impact on the inflation in the provinces of Sumatra in the short run. Furthermore, it is observed that the coefficient of the ECT is negative and significant at the 5% and 10% levels, indicating the presence of a long-term equilibrium. The ECT coefficient of -0.509 suggests that any deviation from the long-term equilibrium corrects itself at a speed of 0.509.

The results of the long-term estimation indicate a significant negative impact of Fintech on inflation in the provinces of Sumatra Island during the observation period, with the coefficient of -1.172, which is implicative of the fact that a 1-unit increase in the Fintech index will reduce inflation by 1.172 percent, assuming that other variable influences should remain constant, which suggests that intensifying Fintech activities enhances efficiency in financial transactions and can suppress transaction costs. These findings align with the study by Y. B. Romdhane *et al* (2023), who concluded that the active use of Fintech in two-way transactions, both in sales and in purchases, had a reducing effect on inflation. Furthermore, Fintech activities such as loan distribution can support optimal economic growth through cost efficiency and the provision of more effective services, thereby alleviating the demand-side inflationary pressures. In turn, the ease of access provided by Fintech to various economic actors may lead to efficiency, stimulate a higher output, and increase income (Mumtaz & Smith, 2020; Zhang, Tan, Hu, Wang & Wan, 2020; Abbasi, Alam, Du & Huynh, 2021).

The digitization aspect plays a crucial role in driving Fintech adoption. Digitization holds a significant position in the financial industry as it can reduce costs, improve access to and the quality of financial

services, and create a more diverse financial landscape (Lee & Shin, 2018). Provincial governments in Sumatra must develop the digital infrastructure, including ATMs and other payment systems, to support noncash transaction activities. Additionally, the readiness of the community to adopt Fintech also presents challenges. Therefore, the development of Fintech needs to be balanced by providing financial literacy education and making consumer protection efforts, fostering trust among the public in using Fintech as an innovative financial service. Intensive education can ensure a more direct Fintech use and mitigate potential risks (Suryono, Budi & Purwandari, 2021).

Subsequently, the Dumitrescu-Hurlin panel causality test was done in this study in order to examine the causal relationships among the variables, the test being based on the null hypothesis that no homogeneous causality is present across the cross-sections. Two lags were selected for the causality test using the AIC approach. In Table 9, the results of the panel causality test indicate bidirectional causality between inflation and Fintech, and between inflation and money supply as well, with the p -values lesser than alpha. Unidirectional causality is perceived to exist between the interest rates and inflation, and between inflation and the exchange rates as well. The panel causality results underscore the need for policymakers to consider how innovations in financial technology and adjustments in monetary supply can impact inflation. In the meantime, the identification of unidirectional causality from the interest rates to inflation and from inflation to the exchange rates provides target insights for the monetary policy and the exchange rate management. These findings are essential for crafting effective economic policies, enhancing stability, and guiding strategic decisions in both financial and real sectors.

CONCLUSION

This study investigates the influence of financial technology on the inflation rate. The results indicate that Fintech can potentially reduce inflation in the

Table 9 The pairwise Dumitrescu-Hurlin panel causality test

Null Hypothesis	W-Stat.	Zbar-Stat.	P-value.	Conclusion
FTI → Log_INF	6.280	5.835	0.000***	Rejected
Log_INF → FTI	4.575	3.443	0.001***	Rejected
IR → Log_INF	4.955	3.975	0.000***	Rejected
Log_INF → IR	3.024	1.266	0.206	Accepted
Log_ER → Log_INF	1.776	-0.484	0.628	Accepted
Log_INF → Log_ER	4.703	3.622	0.000***	Rejected
Log_GRDP → Log_INF	1.547	-0.805	0.421	Accepted
Log_INF → Log_GRDP	2.970	1.191	0.234	Accepted
Log_MS → Log_INF	3.640	2.131	0.033**	Rejected
Log_INF → Log_MS	3.812	2.372	0.018**	Rejected
IR → FTI	4.783	3.734	0.000***	Rejected
FTI → IR	3.228	1.553	0.120	Accepted
Log_ER → FTI	0.702	-1.991	0.046**	Rejected
FTI → Log_ER	3.593	2.065	0.039**	Rejected
Log_GRDP → FTI	4.262	3.003	0.003***	Rejected
FTI → Log_GRDP	5.723	5.053	0.000***	Rejected
Log_MS → FTI	5.824	5.195	0.000***	Rejected
FTI → Log_MS	4.701	3.620	0.000***	Rejected
Log_ER → IR	1.740	-0.535	0.593	Accepted
IR → Log_ER	8.344	8.731	0.000***	Rejected
Log_GRDP → IR	3.967	2.590	0.009***	Rejected
IR → Log_GRDP	2.657	0.752	0.452	Accepted
Log_MS → IR	1.902	-0.307	0.759	Accepted
IR → Log_MS	0.516	-2.252	0.024**	Rejected
Log_GRDP → Log_ER	3.905	2.503	0.012**	Rejected
Log_ER → Log_GRDP	6.199	5.721	0.000***	Rejected
Log_MS → Log_ER	1.634	-0.684	0.494	Accepted
Log_ER → Log_MS	0.428	-2.376	0.018**	Rejected
Log_MS → Log_GRDP	7.062	6.933	0.000***	Rejected
Log_GRDP → Log_MS	3.602	2.077	0.039**	Rejected

Note: ** and *** indicate the significance levels of 5% and 1%, respectively.

Source: Authors

long run. This study suggests that a more intensive use of Fintech can create an efficient economic environment and support economic stability. Not only does Fintech help reach the unbanked, but it also offers cost-efficient financial services, improves the quality and reach of financial services, and creates a more diverse financial landscape. This finding is consistent with the previous studies demonstrating the role of Fintech in stabilizing inflation rates in

various countries. This study suggests the necessity of enhancing the digital infrastructure to expedite the development of Fintech, particularly in Indonesia.

The findings of the study offer valuable insights into the potential of financial technology (Fintech) to reduce inflation, particularly in Sumatra Island, Indonesia. The results reinforce the notion that Fintech can enhance economic stability by improving transaction efficiency and loan distribution as a component of economic digitalization. This study suggests that Fintech can effectively control inflation, particularly in the areas experiencing rapid Fintech growth, such as Sumatra. The findings imply that the central bank should integrate Fintech development in the monetary policy framework and consider it an essential factor in inflation analysis and policy decision-making. Furthermore, the central bank must collaborate closely with the other regulators so as to guarantee that Fintech's progress stays within the robust regulatory framework, promoting innovation and simultaneously mitigating related risks. Local governments in Sumatra play a crucial role in supporting the implementation of Fintech. They must ensure the availability of an adequate digital infrastructure and promote Fintech adoption among businesses and communities. These measures include improving access to the high-speed Internet, supporting digital education and training, and promoting financial inclusion through Fintech.

This study has several limitations that should be considered in future research. Specifically, the geographical focus on Sumatra restricts the generalizability of the findings, suggesting that further research should be done in order to explore the impact of Fintech on inflation in the other regions of Indonesia or even in other countries. Secondly, since this study relies on the secondary data, incorporating primary data (such as surveys or interviews) may be beneficial to gain a more comprehensive understanding of how Fintech influences economic agents' daily economic decisions. Another limitation is the study's timeframe, i.e. its spanning from January 2020 to June 2023. This period was chosen due to the availability of consistent and relevant data. Expanding the timeframe in future research could

provide a more robust analysis of the trends and the long-term effects of Fintech. Finally, future research should delve into the long-term effects of Fintech on broader economic aspects, such as employment growth and the development of small and medium-sized enterprises (SMEs).

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DA LI FINANSIJSKA TEHNOLOGIJA SMANJUJE INFLACIJU? LEKCIJE KOJE SMO NAUČILI NA PRIMERU SUMATRE

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Ovaj rad ima za cilj da istraži uticaj finansijske tehnologije (*Fintek*) na stopu inflacije. Doprinos ovog rada se ogleda u kreiranju novog indeksa za *Fintek*, koji u sebi sadrži nekoliko pokazatelja koji koriste analizu glavnih komponenata. Podaci koji se u radu koriste su podaci iz skupa panel podataka koji se odnose na 10 pokrajina ostrva Sumatra, Indonezija, u vremenskom periodu od januara 2020. do juna 2023. godine. Metoda za procenu sakupljene srednje grupe (*PMG*) je primenjena za testiranje odnosa *Finteka* i stope inflacije. Saznanja do kojih se u ovoj studiji došlo ukazuju na činjenicu da *Fintek* ima tu sposobnost da utiče na smanjenje inflacije dugoročno posmatrano. Stoga se u ovoj studiji podrazumeva neophodnost intenziviranja korišćenja *Finteka* u stvaranju efikasnog ekonomskog okruženja i promovisanje ekonomske stabilnosti.

Ključne reči: finansijska tehnologija, inflacija, Sumatra, sakupljena srednja grupa

JEL Classification: E31, G23

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TRŽIŠTE STANOVA U SRBIJI - SEGMENTIRANOST, ARBITRAŽA I PRECENJENOST

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U radu se razmatraju trendovi i analiziraju pravilnosti koje se pojavljuju na nacionalnom tržištu stanova u Srbiji i na njenim regionalnim tržištima. Polazi se od pretpostavke da se pored zajedničkih tržišnih sila, tržište novoizgrađenih stanova i tržište postojećeg stambenog fonda ponašaju kao dva izdvojena segmenta tržišta stanova sa nepotpunim prilagođavanjem cena. U glavnom fokusu analize je udaljavanje cena na ova dva segmenta, sa posebnim interesom za proces uzajamnog prilagođavanja. Primenjeni su Granger-ovi testovi uzročnosti kako bi se ispitalo da li postoji bilo kakva uzročna zavisnost u indeksima cena na ova dva tržišna segmenta, i utvrđeno da slučaj uzročnosti od tržišta postojećeg stambenog fonda ka tržištu novoizgrađenih stanova preovladava među regionalnim tržištima. Ista metodologija je primenjena da bi se proverilo da li postoji uzročnost između regionalnih tržišta. Rezultati su potvrdili verovatan uticaj beogradskog tržišta novoizgrađenih stanova na tržišta u ostalim regionima. Ovakvi nalazi će pomoći da se bolje razumeju procesi prilagođavanja cena između pomenuta dva segmenta tržišta i oblikuju izvesne preporuke za ekonomsku i srodne politike.

Ključne reči: regionalno tržište stanova, Granger-ova uzročnost, efikasnost tržišta, razvoj gradova

JEL Classification: R31, R21, G51, C32

UVOD

Karakteristične odlike stanova kao kapitalnog dobra su trajnost, heterogenost i vezanost za lokaciju (Smith, Rosen & Fallis, 1988). Iako i druga dobra imaju neka od ovih obeležja, stanovi objedinjavaju sva ova obeležja, i to u meri koja prevazilazi prisustvo ovih obeležja kod svih drugih razmenljivih dobara.

Trajnost je posledica dugog fizičkog i ekonomskog životnog veka stambenog objekta. Za funkcionisanje tržišta, to znači da u bilo kom momentu postojeći broj stanova značajno prevazilazi broj novoizgrađenih. Ova odlika ograničava značaj trenutnog nivoa aktivnosti u stanogradnji za ukupnu ponudu stanova. Heterogenost stanova postaje problem koji se mora prevazići da bi došlo do cena koje se mogu porediti kako u prostornoj tako i u vremenskoj dimenziji. Na primer, studije determinanti cena pojedinačnih stanova rade sa desetinama obeležja koja mogu objasniti neujednačenost cena različitih

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stanova (Ke, Yang, Shi, Mougharbel, Guo, & Zheng, 2023; Cai, Smit & Helbich, 2024; Soltani, Zali, Aghajani, Hashemzadeh, Rahimi & Heydari, 2024). Poslednje obeležje je zaslužno za prostornu rigidnost ponude stanova, tj. usluge stanovanja, i prostornu segmentaciju tržišta stanova. Uporedo sa silama koje usmeravaju prostornu distribuciju tražnje za stanovima, ovo obeležje ponude će odlučujuće uticati na održavanje prostorne varijabilnosti cena stanova.

Stan može služiti različitim svrhama. Može biti dobro trajne potrošnje, investiciono ili spekulativno dobro. U meri u kojoj se ove svrhe mogu razgraničavati, moguće je razlikovati tri komponente ukupne tražnje za stanovima: tražnja radi potrošnje, investiciona i spekulativna tražnja. Samo deo stanova se kupi da bi vlasnik u njima i živeo. Za ove stanove kaže se da služe u svrhe potrošnje. Ako neko kupuje stan da bi ga dao u zakup (iznajmio), taj stan postaje investiciono dobro i, dakle, predstavlja investicionu tražnju. Ako neko stan kupi da bi ga ubrzo prodao po višoj ceni, on postaje spekulativno dobro i predstavlja spekulativnu tražnju. Poslednja dva motiva nije lako razgraničiti, jer očekivan rast cene može biti sagledan kao važan izvor prihoda čak i kod investiciono-motivisane kupovine, isto kao što spekulativno-motivisana kupovina ne isključuje prihode od renti. Ovi motivi se razlikuju po tome koji izvor prihoda (renta ili kapitalna dobit) dominira kod donošenja odluke o kupovini stana. Onaj deo tražnje koji se odnosi na potrošnju je najmanje osetljiv na promene cena, investiciona tražnja će uglavnom zavisiti od odnosa između cene stana i visine rente, sada i u budućnosti, dok će spekulativna tražnja biti jasno određena kretanjem cena.

U ovom radu se istražuje stanje na tržištu stanova u Republici Srbiji. Uprkos živoj debati u javnosti, srpsko tržište stanova do sada nije privuklo mnogo pažnje u naučnoj zajednici (po saznanjima autora, među retkim izuzecima su Đorđević & Petronijević, 2015; Radivojević, 2019; Martin, 2023; Marinković, Džunić & Marjanović, 2024). Poslednjih godina, Srbija je svedočila postojanom rastu cena stanova. Intenzivirana stanogradnja (Jakopin & Gračanac, 2023) izgleda nije mogla da drži korak sa sve većom tražnjom. Istovremeno, uzlazni trend cena nije bio

jednako snažan u svim regionima, i takođe jednako snažan u segmentu novogradnje u poređenju sa cenama na tržištu starogradnje. U fokusu ovog rada su razlozi za divergentne procese koji se mogu pripisati slabom delovanju sila koje bi trebalo da dovedu do konsolidacije tržišta. Ako su te sile slabe, cene će se prilagođavati sporo i nepotpuno, ukazujući na značaj strukturnih uzroka neefikasnosti tržišta stanova. Zbog toga se u radu primenjuju *Granger*-ovi linearni testovi uzročnosti na parovima indeksa cena stanova prilagođenih za razlike u kvalitetu stanova, testirajući nulte hipoteze da uzročnost ne postoji. Ova metodologija može otkriti smer uticaja kao i dužinu kašnjenja u procesu prilagođavanja. To je prihvaćena metodologija koja se često koristi kod istraživanja uzajamno-zavisnog kretanja indeksa cena akcija ili uzročnosti kod različitih makroekonomskih ili makrofinansijskih varijabli (Gradojević & Dobardžić, 2013; Marinković & Radović, 2014; Radojčić & Radović, 2023; Ekşi, Zeren & Gürsoy, 2024).

U narednom odeljku je izvršen pregled ključnih relacija koje ekonomska nauka koristi da bi objasnila determinante tražnje i ponude stanova. Nakon toga, analizira se na koji način tražnja i ponuda međusobno reaguju, i kako te reakcije obrazuju ravnotežnu cenu. Analize se zasnivaju na doprinosima teorije mikrostrukture tržišta. U radu se polazi od pretpostavke da je tržište stanova tip tržišta sa nepotpuno integrisanim segmentima novogradnje i starogradnje. U četvrtom odeljku je izvršena statistička analiza podataka i utvrđeno da se u srednjem roku cena novogradnje sistematski razlikuje od cene starogradnje, što je pripisano nesavršenom procesu prilagođavanja cena koji stvara nepotpuno usklađivanje cena stanova na ova dva segmenta tržišta. U poslednjem delu su izneti zaključci.

RAVNOTEŽA NA TRŽIŠTU STANOVA

Osnovni okvir za makroekonomsku analizu tržišta stanova je tzv. model zaliha. Model zaliha za tržište stanova pripada posebnoj grupi ekonomskih modela koji se koriste da bi se formalno predstavilo tržište za ona dobra koja se stalno proizvode (tok) i koriste

tokom niza godina (zaliha). Model zaliha razlikuje zaliha (kapitalnih dobara ili dobara trajne potrošnje), koja je rigidna u kratkom roku, i tok proizvodnje, koji brže reaguje na promene u ekonomskim uslovima.

Model zaliha sa dve jednačine adaptiran za analizu tržišta stanova (Poterba, 1984; DiPasquale & Wheaton, 1994; Meen, 2002) prikazuje funkciju tražnje za stanovima i funkciju ponude stanova. Obe funkcije su, po pretpostavci, određene cenom stanova, pa se tražnja u krajnjem izjednačava sa ponudom, a tržište stanova postiže ravnotežu sa cenom stanova koja 'čisti' tržište. Prema J. Poterba (1984), tražnja za stambenim uslugama je opadajuća funkcija cene rente, isto kao što se ponuda stambenih usluga smatra rastućom funkcijom cene rente. Broj stambenih jedinica se uključuje u model pretpostavkom da postojeći stambeni fond (u kratkom roku novoizgrađeni stanovi ne igraju ulogu) generiše ponudu stambenih usluga. Na taj način, ponuda stambenih usluga zavisi od postojećeg broja stanova i cene rente. Ravnotežna cena rente uravnotežava ponudu i tražnju za uslugama stanovanja. Troškovi stambenih usluga se nalaze u srazmeri sa realnom cenom stanova (P), i uključuju: amortizaciju (po stopi δ), troškove popravke i održavanja (κ), kamatu na stambeni kredit i stopu oportunitetnih troškova za iznos sopstvenih sredstava u finansiranju nekretnine (po stopi i). U troškove se uključuju i poreske obaveze: porez na dohodak po stopi θ , i porez na imovinu po stopi μ . Za one stope koje se mogu razlikovati (nisu iste za sve pojedince) pretpostavlja se da su iskazane kao marginalne veličine. Zbir pomenutih troškova se umanjuje za nominalnu kapitalnu dobit (π_H) da bi se došlo do marginalne vrednosti troškova pruženih stambenih usluga.

Pretpostavlja se da u bilo kom momentu vlasništvo nad stanom podrazumeva finansiranje kupovine sredstvima pozajmljenim sa kreditnog tržišta po kamatnoj stopi (i) i sopstvenim sredstvima za koje se očekuje da u alternativnim upotrebama ostvare prinos po identičnoj stopi i . Tretman kapitalne dobiti je specifičan za model, ali valja znati da se kapitalna dobit može dodati marginalnoj vrednosti stambenih usluga ili odbiti od troškova. Kapitalna dobit je količnik promene cene stana (ΔP) i prethodne cene

stana (P), pa, izražena u realnim veličinama, kao što je to slučaj u modelu, predstavlja razliku između inflacije cene stanova i opšte inflacije. Inflacija cena stanova i opšta (stopa rasta potrošačkih cena) inflacija su dragoceni koncepti u analizi tržišta stanova. Značaj inflacije za tržište stanova se zasniva na zamenljivosti između stanova kao imovine i korpe potrošačkih dobara. Ravnotežno stanje na tržištu stanova se izražava sledećom jednačinom:

$$\Delta P = vP - R \quad (1)$$

gde je:

$$v = \delta + \kappa + (1 - \theta)(i + \mu) - \pi \quad (2)$$

R je marginalna vrednost usluga stanovanja koju stvara postojeći stambeni fond (H), a vP je koncept sličan konceptu troškova usluga stanovanja koji padaju na teret vlasnika stana koji ove usluge pruža. Promenljivu v ne treba mešati sa stopom troškova pruženih usluga stanovanja, jer se kod ovog koncepta inflacija na tržištu stanova (π_H) zamenjuje opštom inflacijom (π), pa je na taj način isključena realna kapitalna dobit (π_Q). Za stopu troškova usluga stanovanja u proračun se uključuje inflacija na tržištu stanova, odnosno nominalna kapitalna dobit. Po ekonomskoj teoriji, usluge stanovanja će se pružati sve dok marginalni troškovi usluga stanovanja ne prevaziđu marginalnu vrednost ovih usluga.

Na taj način, jednačina (1) označava da uvek kada troškovi usluga stanovanja (koji ne obuhvataju realnu kapitalnu dobit) prevazilaze marginalnu vrednosti usluga stanovanja, investitor mora biti kompenziran rastom cena stanova. Za uslov efikasnosti tržišta stanova takođe je potrebno da važi sledeća arbitražna relacija (rearanžirano od G. Meen (2002), 6):

$$P = R / [\delta + \kappa + (1 - \theta)(i + \mu) - \pi_Q] \quad (3)$$

Gde je R realna cena rente pripisana usluzi stanovanja. Smisao jednačine (3) je da se cena stana može izraziti kao cena rente (dohodak od pružene usluge stanovanja izkazan kao deo cene stana) diskontovana zbirom stopa svih troškova koji nastaju zbog vlasništva nad stanom (tzv. troškovi duge pozicije). Ova arbitražna relacija polazi od pretpostavke da se tokovi prihoda

i troškova realizuju u kontinuitetu, tj. predstavljeni su kao beskonačni nizovi.

Sledeće jednačine objašnjavaju kako se aktivnost u novogradnji povezuje sa uslovima na tržištu postojećeg stambenog fonda. Ukupna ponuda stanova (H_s) je zbir poslednje promene u broju stanova i postojećeg stambenog fonda. Promena u broju stanova (ΔH_s) je razlika između broja završenih stanova, tj. investicija u stanogradnju (I) i amortizacije postojećeg stambenog fonda (δH). Investicije u stanogradnju se definišu kao promenljiva koja zavisi od cene stanova, tj. kao rastuća funkcija cene stanova ($I = f(P); f' > 0$):

$$H_s = I + (1 - \delta)H \quad (4)$$

$$\Delta H_s = I - \delta H = f(P) - \delta H \quad (5)$$

Model koji je razvio J. Poterba (1984) ima dosta vrednih obeležja jer omogućuje da se obuhvate usluge koje generišu stanovi kao potrošno, investiciono, pa čak i spekulativno dobro. Najpre, vrednost usluge stanovanja je dovoljno širok koncept koji lako može uključiti ne samo dohodak od rente, već i sve užitke koji pripadaju vlasniku koji živi u svom stanu, pa time ovaj model obuhvata i stan kao potrošno dobro. Drugo, model eksplicitno uključuje cenu rente i kapitalnu dobit, što ga čini prikladnim za analizu investicionih i spekulativnih motiva.

Mada je ovaj model temelj u ekonomskom modeliranju tržišta stanova, izvesni autori su ga kasnije unapredili time što su bili konkretniji u definisanju determinanti investicija u novogradnju kao i determinanti tražnje za stanovima. Na primer, D. DiPasquale i W. C. Wheaton (1994) su proširili skup promenljivih koje bi trebalo koristiti u projektovanju tražnje za stanovima kako bi uključili vektor egzogenih promenljivih kao što su demografska obeležja, dohodak i bogatstvo domaćinstava. Kasniji doprinosi (DiPasquale & Wheaton, 1994; Meen, 2002) podvlače da aktivnost u novogradnji neće zavisiti toliko od cena stanova koliko od marže u industriji stanogradnje, odnosno razlici između prodajne cene i jediničnih troškova gradnje (zemljište, rad, materijal, tehnologija, troškovi finansiranja). Neki autori (Glaeser & Gyourko, 2018)

koriste količnik cene stanova i troškova gradnje koji garantuju minimalnu profitabilnost građevinskoj industriji, što je koncept sličan *Tobin*-ovom q , standardnom količniku tržišne vrednosti imovine i aktuelnih troškova zamene te imovine. Ovakav pristup ima određene prednosti jer su projekti izgradnje stanova višegodišnji proizvodni poduhvati, tako da troškovi koji igraju ulogu u određenju cene moraju biti aktuelni, a ne istorijski (realno nastali) troškovi. Takođe, troškovi izgradnje koji garantuju minimalnu profitabilnost će znatno zavisiti od lokacije i efikasnosti investitora, tako da i u ovom slučaju marginalna veličina troškova mora biti to što će igrati ulogu u razmatranjima tržišta stanova.

Kada je reč o stopi amortizacije (δ) treba uočiti da ova stopa nije čisto računovodstveni¹ parametar, niti čisto inženjerski. Različiti događaji socijalne prirode mogu uticati na visinu ove stope. Na primer, promene u visini slobodnog dohotka, prosečne veličine domaćinstva, standarda stanovanja i navika, pa i značajne urbanističke intervencije, mogu deo stambenog fonda učiniti neprivlačnim, i kao posledica, napuštenim ili podvrgnutim rušenju. Učešće porušenih stanova, takođe, vremenom može značajno varirati. Na primer, u prvih četiri decenija 20-og veka u SAD godišnja stopa porušenih stanova bila je manja od 0,2 procenta (Blank & Winnick, 1953) dok savremeni standardi u SAD predviđaju rušenje nakon tek pedesetak godina korišćenja. Prosek za Srbiju u 2021. godini je iznosio 0,06 procenata, dok je broj završenih stanova iznosio nešto manje od jednog procenta postojećeg stambenog fonda (RZS, 2022).

Mada eksplicitno uvodi razliku između tržišta postojećeg stambenog fonda i tržišta novoizgrađenih stanova (Poterba, 1984), predstavljen model ne pravi razliku između cene starogradnje i cene novogradnje. Očigledno je da je cena koja se pojavljuje u prvom skupu jednačina (1-3) u stvari cena na sekundarnom tržištu stanova, dok cena u poslednjoj jednačini (5) mora biti cena sa primarnog tržišta stanova, ukoliko se prihvati da se ove dve cene mogu sistematski razlikovati.

MIKROSTRUKTURA TRŽIŠTA STANOVA

Stan je dobro koje ima previše individualnih obeležja koja ograničavaju napore da se umanju neizvesnost u pogledu kvaliteta dobra. To dobro se ne može standardizovati do nivoa koji bi omogućio razmenljivost različitih jedinica dobra. Zbog toga se stanovima uvek trguje preko brokerskog mehanizma. Agencije za nekretnine deluju kao brokери. Agencije aktivno tragaju kako bi uparile prodavce sa kupcima i koordiniraju razmenu prodavaca i kupaca na brokerskom tržištu. Na tržištu nisu aktivni dileri koji mogu pomoći da se uskladi tražnja i ponuda prihvatajući rizik povezan sa promenom nivoa zaliha (Harris, 2003). Na tržištu stanova gotovo nijedna transakcija ne prolazi kroz privremenu zalihu dilera. Zbog nedovoljno učestale trgovine² dileri nisu u stanju da se pozicioniraju na tržištu stanova.

“Prodavci stanova su po pravilu manje zainteresovani za kratkoročnu promenljivost cena, i samim tim momentalnu realizaciju, nego za to da obezbede da se što veći broj potencijalnih kupaca informiše o njihovoj ponudi za prodaju. Pored toga, potencijalni market mejkери se suočavaju ne samo sa uobičajenim troškovima koji prate kontinuirano prisustvo na nelikvidnom tržištu, već dodatno i sa problemom pogrešnog izbora koji potiče od potencijalno nepovoljnih ličnih i skrivenih informacija vlasnika o njegovoj nekretnini. Kao rezultat nastaje tržište na kome posrednici, u meri u kojoj su uopšte prisutni, pružaju brokerske ili usluge traganja, ali ne i usluge momentalne realizacije trgovine.” (Grossman & Miller, 1988, 620).

Ne samo market mejkери³ već i profesionalni trgovci⁴ retko pokušavaju da na tržištu stanova iskoriste intertemporalne promene cena. Ovim se doprinosi neefikasnosti tržišta stanova, koje R. Shiller (2014) dovodi u vezu sa visokim troškovima trgovanja. Za trgovce je skupo da ulaze na tržište i izlaze sa tržišta kako bi profitirali na predvidivim promenama cena (visoke agencijske provizije za prodavce i visoki troškovi traganja za kupce). Teško je profitirati ukoliko su cene stanova previsoke, jer terminsko tržište i mogućnost za prodaju stana koji ne posedujemo nisu raspoloživi, troškovi koji stvara vlasništvo nad stanom

su visoki jer je prihod od zakupa mali u poređenju sa troškovima održavanja, a postoji i mnogo faktora tražnje koji su specifični za lokalnu sredinu, koje je teško predvideti. Ako se očekuje natprosečni prinos zbog toga što se predviđa rast cena stanova, ništa ne može sprečiti strategiju ‘kupi i čekaj’. Zbog toga se na tržištu stanova obrazuju serijski korelisane promene cena koje se mogu koristiti u trgovanju primenom jednostavnih obrazaca (Case & Shiller, 1989). Ipak, razvoj događaja u finansijskoj sferi donosi izvestan optimizam da će tržište stanova dostići nivo efikasnosti uporediv sa onim koji postoji na mnogim finansijskim tržištima. Pojava investicionih fondova specijalizovanih za tržište nekretnina koji pokušavaju da ostvare zaradu kupovinom i prodajom stanova može biti prekretnica za tržište stanova.

Segmentacija tržišta stanova

Transakcije primarnog tržišta uključuju novogradnju, dok transakcije sekundarnog tržišta uključuju trgovinu postojećim stambenim fondom. Dok je primarno tržište ograničeno obimom stanogradnje, sekundarno tržište je teorijski neograničeno. Može rasti do nivoa koji višestruko prevazilazi primarno tržište⁵. Ideja o segmentaciji tržišta na primarno i sekundarno je eksplicitno primenjena kod D. Mauer i L. Senbet (1992) za slučaj tržišta IPO. Autori su utvrdili razliku u cenama na ova dva segmenta koja odražava premiju rizika na primarnom segmentu tržišta, a koja potiče od ograničenog pristupa investitora primarnom tržištu i nesavršene zamenljivosti aktive na sekundarnom tržištu. Slično tome, A. Gordon i M. Peterson (2020) su utvrdili da postoji povezanost cena na primarnom i sekundarnom tržištu ETF koju obezbeđuju transakcije arbitraže. Za tržište stanova, do sada je ideja o postojanju dva segmenta tržišta uglavnom korišćena kako bi se izvela jedinstvena cena stanova, bez posebne želje da se analiziraju specifičnosti određivanja cena na ova dva segmenta. Interesantno je pitanje koji segment tržišta reaguje prvi a koji naknadno kod određivanja cene. Iz prethodnih razmatranja je poznato da se troškovi gradnje ugrađuju u cenu stanova. Po modelu zaliha proizilazi da se troškovi gradnje pojavljuju u jednačini cene stanova samo na primarnom tržištu,

jer su ovi troškovi jedino u ovom slučaju aktuelni, dok na sekundarnom tržištu vlasnik-prodavač može imati nekakvu evidenciju o stvarnim troškovima gradnje ili kupovine, ali su ovi troškovi vremenom izgubili svoju aktuelnost zbog čega neće imati direktan uticaj na prodajnu cenu, ako ga uopšte bude.

Kada je reč o odnosu između postojećeg broja stanova i broja novoizgrađenih stanova (primarno tržište), pravilo je da prvi broj uveliko prevazilazi potonji broj. Kao što je već pomenuto, odnos broja stanova u novogradnji prema ukupnom broju stanova je veoma nizak. Na primer, broj novoizgrađenih stanova na području 24 srpska grada za period 2011-2021. godine u proseku je iznosio 0,55 procenata postojećeg stambenog fonda. Pomenuti odnos se kretao u rasponu od 0,02 to 2,67 procenata. Najviša vrednost je zabeležena 2021. godine u Novom Sadu (RZS, 2022). S obzirom da je stanogradnja uglavnom skoncentrisana u gradskim područjima, nacionalni prosek, koji uključuje i ruralne oblasti, zasigurno je niži. Međutim, dok se novogradnja u celini nalazi na tržištu, samo se deo postojećeg stambenog fonda pojavljuje na tržištu. Istraživači (vidi Olsen, 1969; Poterba, 1984) ponekad prevazilaze ovaj problem birajući da rade sa konceptom usluge stanovanja umesto sa brojem stambenih jedinica koje se nude na tržištu. Na taj način, svaki stan, bilo da ga koristi vlasnik ili zakupac, pruža uslugu stanovanja, bez obzira da li je ponuđen na tržištu ili ne. Međutim, upravo od toga koliki je deo postojećeg stambenog fonda koji se nudi na tržištu zavise kratkoročne promene cena. Ovaj deo ukupne ponude je posebno sklon promenama. Suštinski, postojeći stambeni fond predstavlja latentnu ponudu. To je rezervoar iz koga se napaja ponuda i koji aktivira tržišna cena. Ovaj deo ponude je spekulativan po svojoj prirodi. Visoke cene ga uvećavaju dok depresirane cene mogu učiniti da gotovo u potpunosti iščezne. Na taj način ponuda novoizgrađenih stanova, ali i ponuda postojećih stanova će snažno zavisiti od kretanja cena.

Ako po strani ostavimo razlike u oporezivanju, što se tiče determinanti tražnje primarno i sekundarno tržište stanova mogu se smatrati gotovo savršenim supstitutima. Dakle, uprkos razlikama u razlozima koji oblikuju odluku da se stan gradi radi prodaje

u odnosu na odluku da se proda ranije kupljen stan, tržište stanova bi moralo da se ponaša kao segmentirano tržište koje teži da se konsoliduje. Tržište stanova je jednim delom segmentirano time što je primarno tržište pristupačno samo određenim kupcima koji su podskup ukupne populacije kupaca. Suprotno od toga, na sekundarnom tržištu se pojavljuju i ostali kupci. Naime, imajući u vidu da se u Srbiji veliki deo novogradnje proda pre okončanja gradnje (u tzv. 'sivoj' fazi ili čak u fazi planiranja i projektovanja) kupci na primarnom tržištu moraju biti kompenzirani za izlaganje riziku koje potiče od intertemporalnih promena cena i ostalih netrivialnih razloga koji mogu ugroziti završetak projekta, a takođe i za otkrivanje informacija javnosti i za finansiranje investitora u periodu pre nego što stan počne da obezbeđuje bilo kakvu uslugu. Zbog tih razloga cena istog stana na primarnom tržištu može se razlikovati od cene na sekundarnom tržištu.

Konsolidacija segmentiranih tržišta

Pored raznih drugih uticaja, segmentacija tržišta može i izolovati segmente tako da cene u jednom segmentu nemaju uticaj na cene u drugim segmentima (Chen & Duffie, 2021). Po doprinosima teorije mikrostrukture tržišta, postoje tri mehanizma kojim se segmentirano tržište može konsolidovati (Harris, 2003). Najpre, u okviru svakog tržišnog segmenta, učesnici na tržištu prilagođavaju cene po kojima su spremni da trguju tako da odražavaju informacije sa svih segmenata. Drugo, neki učesnici usmeravaju svoje trgovanje na one segmente na kojima očekuju najpovoljnije cene. Konačno, arbitražeri trguju uvek kada su cene u jednom segmentu neusklađene sa cenama u drugom segmentu.

Na tržištu stanova prvi mehanizam konsolidacije će biti efikasan ako nema značajnijih prepreka u protoku informacija. Agencije za nekretnine prikupljaju informacije od prodavaca sa primarnog (investitora) i sekundarnog tržišta i objavljuju ih bez posebne naknade. Potencijalni kupci mogu lako pristupiti tim informacijama, mada ne i bez izlaganja troškovima, jer zbog heterogenosti stanova troškovi traganja nisu zanemarljivi (prevashodno zahtevaju dosta vremena).

Pored agencija i sami investitori ulažu u direktnu prodaju preko internet platformi i prodajne mreže. Drugi mehanizam deluje nešto drugačije od opšteg slučaja koji smo opisali, jer samo kupci mogu birati segment. Konačno, na tržištu stanova postoji i prostor za delovanje arbitraže.

Očigledno je da nemogućnost da se obavi prodaja stana koji trenutno nije u posedu (Glaeser & Nathanson, 2015), i smanjena mogućnost da se unapred obavi kupovina stana, ograničavaju šanse arbitražera da iskoriste neefikasnosti na tržištu stanova. Neki autori (Caplin & Leahy, 2011) pripisuju serijsku korelisanost cena stanova (održavanje trendova cena) nekim specifičnostima tržišta stanova. Naime, tokom perioda viška ponude kupci ostvaruju koristi na teret prodavaca. Ali, mogućnost za tako nešto nije neograničena, jer prodavci imaju opciju da odlože prodaju, jer, suprotno drugim dobrima, posjedovanje stana u vlasništvu ne opterećuje visokim troškovima. Suprotno mnogim drugim dobrima sa fizičkom sadržinom, a slično finansijskoj aktivni, stanovi pružaju usluge čija vrednost može prevazići redovne troškove koje vlasništvo podrazumeva. Ishod kod prodavaca koji odluče da prodaju mora biti najmanje jednako dobar ishodu onih prodavaca koji odlažu prodaju, što dovodi do uspostavljanja veze između cena istog stana u različitim momentima. Tokom perioda viška tražnje, prodavci ostvaruju koristi na teret kupaca, ali je i mogućnost za ovako nešto ograničena opcijom kupaca da tragaju za stanovima na drugim lokacijama, što povezuje cene stanova u prostoru. U tom smislu, prodavci su odgovorni za intertemporalnu arbitražu, jer su vezani za lokaciju, dok su kupci odgovorni za prostornu arbitražu, jer su slobodni da tragaju u prostoru. Dakle, čak i na tržištu stanova postoje sile arbitraže koje deluju na usklađivanje cena u prostoru i vremenu. Ali, da li su ovakve sile raspoložive za arbitražu između skupova novogradnje i starogradnje?

Na primer, ako je sekundarno tržište relativno skupo, akter koji prodaje svoj stan da bi kupio drugi na primarnom tržištu u stvari obavlja arbitražu. Ovakva arbitraža izlaže arbitražera troškovima preseljenja⁶, pa će biti profitabilna jedino ako je razlika u ceni dovoljno velika da ga obešteti za troškove preseljenja.

U slengu industrije nekretnina ovakve transakcije se nazivaju 'vezanim', i veruje se da značajan deo prometa na tržištu stambenih nekretnina potiče iz ovakvih transakcija. Prirodno je da je samo jedan deo 'vezanih' transakcija motivisan korišćenjem razlika u cenama koje nastaju kao posledica neefikasnosti tržišta⁷. Dalje, ako je sekundarno tržište relativno jeftino, investitor može novčani priliv od prodaje investirati na sekundarno tržište. Na žalost, ovo su jedini načini da se transakcijama sličnim arbitraži iskoriste postojeane i neopravdane razlike u cenama stanova na ova dva segmenta tržišta. Jer, da bi arbitraža delovala savršeno potrebno je da svako može zauzeti svaku poziciju u svako doba, bez angažovanja svojih sredstava i bez izlaganja riziku (Shleifer & Vishny, 1997). U realnom svetu, takvu strategiju nije lako realizovati: arbitražeri su izloženi riziku, nemaju neograničen pristup resursima, prodaja dobra koje nije u posedu obično nije raspoloživa, pa arbitraža u takvim uslovima ne može potpuno uskladiti cene na ova dva segmenta tržišta.

Ukoliko dva dobra nisu savršeni supstituti, proces ujednačavanja cena će i dalje delovati, pa će konačno različiti segmenti tržišta doseći ravnoteže izdvojeno sa posebnim cenama umesto jedinstvene cene, koje će se međusobno razlikovati u meri u kojoj tržište vrednuje razliku između njih. Već je navedeno da je stan vrlo heterogeno dobro trajne potrošnje. Te razlike su manje izražene u okviru novogradnje jer stanovi moraju ispuniti iste savremene standarde i propise u vezi sa gradnjom. Zbog toga je američki statistički biro najpre predložio indeks 'cena novogradnje' koji je takođe nazivan 'Indeks cena stanova postojanog kvaliteta' (Shiller, 2014, 1502). Međutim, da li između skupa stanova u novogradnji i starogradnji postoje sistematske razlike u obeležjima važnim za utvrđivanje cene? Zbog pojednostavljenja, u nekim ekonomskim modelima (Poterba, 1984) se polazi od pretpostavke da je novogradnja po kvalitetu identična postojećem stambenom fondu, ali kako to izgleda u realnosti? Najznačajniji izvor razlika između novogradnje i starogradnje je lokacija. Lokacija nije izvor vrednosti kojim se može slobodno trgovati jer već izgrađene lokacije nije moguće konvertovati u građevinsko zemljište i koristiti za nove građevinske projekte. Najbolje lokacije su verovatno već zauzete

postojećim stambenim fondom, tako da se novi projekti moraju locirati u oblastima na periferiji gradova, koje su manje atraktivne i često nisu adekvatno pokrivene infrastrukturom, ili u užem gradskom jezgri gde nedostatak zemljišta koje se može koristiti za stanogradnju može ograničiti veličinu ili arhitekturu novih projekata. Drugi izvor razlika između novogradnje i starogradnje su standardi i kvalitet gradnje. U vremenskim distancama od nekoliko decenija promene u standardima stanovanja i životnim navikama povezanim sa različitim definicijama komfora se jasno uočavaju. Primer takvih promena je najnovija regulativa energetske efikasnosti i termalnog komfora. Zbog toga izgleda da se skup stanova u novogradnji može sistematski razlikovati od skupa stanova u starogradnji po pitanju različitih obeležja važnih za utvrđivanje cene, i to u nekim periodima verovatno više nego u drugim.

TRŽIŠTE STANOVA U SRBIJI

U ovom odeljku se razmatraju trendovi na tržištu i analiziraju pravilnosti koje se pojavljuju na stambenom tržištu Srbije i njenih regiona. Pretpostavlja se da pored tržišnih sila koje deluju na celom tržištu, tržište novogradnje i tržište starogradnje predstavljaju izdvojene tržišne segmente sa nesavršenim prilagođavanjem cena. Glavni fokus analize je divergencija cena na ova dva segmenta sa posebnom pažnjom na proces uzajamnog prilagođavanja. Primenjen je *Granger-ov* test uzročnosti da bi se proverilo da li postoji uzročna povezanost kretanja cena na ova dva segmenta. Rezultati pokazuju koji segment prvi reaguje na šokove značajne za kretanje cena, a koji sledi, ako ovakva povezanost uopšte postoji. Pored toga, ista metodologija je primenjena radi provere da li takva uzročna povezanost postoji između različitih regionalnih tržišta.

Skup podataka - indeksi cena stanova

Podaci o cenama stanova se mogu prikupljati iz različitih izvora. Zvanična statistika objavljuje podatke o prosečnoj ceni na osnovu prijavljenih

transakcija za svaku pojedinačnu kupoprodaju. Drugi izvor podataka su agencije za nekretnine koje raspolazu podacima o stanovima u čijoj prodaji posreduju. Bez obzira koliko agencija dominira tržištem, njeni podaci će se odnositi samo na deo ukupnog tržišta. Stanovi se registruju po cenama koju zahteva prodavac, a koja je podložna pregovorima i veoma često se transakcija ugovara po cenama koje su niže od zahtevanih. To je u stvari samo zahtevana kotacija koja se ne može nedvosmisleno uzeti kao tržišna cena. S druge strane, cene registrovane u kupoprodajnim transakcijama takođe ne moraju da budu i objektivne, jer postoji praksa navođenja niže cene u ugovorima kako bi se umanjile poreske obaveze po osnovu realizovane kapitalne dobiti, time i dohotka građana, i poreza na prenos apsolutnih prava ili poreza na dodatu vrednost. Na ovaj način se deo ukupne cene isplaćuje u gotovom i ne registruje u ugovorima. Ova praksa registrovanja transakcija motivisana izbegavanjem poreskih obaveza je verovatnija na tržištu starogradnje. Takođe, prodaja stanova u novogradnji se u velikoj meri obavi bez posredovanja agencija za nekretnine, pa je time oslobođena određenih troškovnih opterećenja. Zbog toga cene novogradnje nisu u potpunosti uporedive sa cenama starogradnje, i nešto su pouzdanije za analizu. Praksa izveštavanja o cenama koja ne uzima u obzir enormnu heterogenost stana kao dobra pati od ozbiljnih nedostaka. Naime, homogeni stanovi su fikcija, pa i prosečna cena stanova.

„Ono što obično nazivamo „stanom“ je različita kombinacija dobara: bakarnih cevi, podnih obloga, zidova, mogućnosti da decu pošaljemo u obližnju državnu osnovnu školu, kao i izloženost izvesnom nivou kriminala i buke. Može izgledati da je ono što najjasnije povezuje ova međusobno različita dobra je mesečna rata kredita za stan kojom ih sve kupujemo“ (King, 1976, 1077).

Svaka stambena jedinica je različita kombinacija unutrašnjih obeležja i lokacionih odrednica, pa otuda i heterogenost (Gobillon & Goffette-Nagot, 2018). Međutim, zahvaljujući unapređenjima u naučnoj metodologiji (Jensen, De Vries, Coolen, Lamain & Boelhouwer, 2008; Hill & Trojanek, 2022), danas možemo izdvojiti zajednički trend cena iz velike korpe

dobara koja se razlikuju u mnogim obeležjima važnim za određivanje cene. Ova metodologija se zasniva na regresijama hedonističkih cena (HPR). HPR indeksi cena obezbeđuju nepromenljivost svih determinanti cena koje utiču na to da se cene individualnih stanova razlikuju, i beleže jedino promene u determinantama koje su zajedničke za sve stanove. Zbog toga takvi indeksi mere inflaciju na tržištu stanova mnogo bolje od bilo kog indeksa koji je dobijen na bazi nepročišćenih podataka o stvarnim transakcijama, ili indeksa koji se zasniva na zahtevanim cenama prikupljenim u agencijama za nekretnine. RGZ (Republički geodetski zavod) objavljuje HPR indekse cena izdvojeno za novogradnju i starogradnju, za period od 2017. godine do danas. Bilo koja razlika u ova dva indeksa time odražava različite uslove na ova dva segmenta tržišta. U Tabeli 1 su prikazani bazni indeksi za Republiku Srbiju i njene regione.

Imajući u vidu cene starogradnje, tržište koje beleži najbrži rast je tržište Vojvodine. Sledi Beograd, Južna i Istočna Srbija pa Šumadija i Zapadna Srbija. U regionu Vojvodine i Beogradskom regionu, cene stanova su više nego udvostručene za poslednjih sedam godina. Kada je reč o cenama novogradnje, dva severna regiona se jasno izdvajaju od južnih regiona. Južni regioni beleže rast cena manji od 50 procenata, dok severni regioni beleže rast od oko 70 procenata. Podaci u poslednjoj koloni predstavljaju količnike koji pokazuju odnos promena cena na dva segmenta tržišta, za nacionalno i regionalna tržišta, a koje možemo tumačiti kao jaz u cenama na ova dva segmenta koji je akumuliran tokom proteklih sedam godina. Ukoliko su cena na primarnom i sekundarnom tržištu bile u ravnoteži početkom

2017. godine, na osnovu indeksa cena stanova RGZ (2024), sledi da je krajem 2023. godine nacionalno tržište starogradnje (sekundarno tržište stanova) bilo prećenjeno u odnosu na tržište novogradnje (primarno tržište stanova) za više od dvadeset procenata. Kao i u prethodnom slučaju, region Vojvodine beleži najviše stope relativne prećenjenosti, Šumadija i Zapadna Srbija ima najskromnije vrednosti, dok su preostala dva regiona na nacionalnom proseku. Ipak, pomenuta pretpostavka o ravnoteži je vrlo sumnjiva, jer ne postoji nijedan razlog da verujemo da su tržišne sile koje bi trebalo da usklade cene na sekundarnom tržištu sa cenama na primarnom tržištu funkcionisale do 2017. godine. Zbog toga je pravi stepen prećenjenosti sekundarnog tržišta verovatno i veći.

Statistički opis podataka

U ovom odeljku je prikazana zbirna statistika serija kvartalnih stopa rasta cena stanova za svaki region (Tabela 2), izdvojeno za novogradnju (cene na primarnom tržištu) i starogradnju (cene na sekundarnom tržištu). Skup podataka se odnosi na Republiku Srbiju (RS), Beogradski region (BEO), Vojvodinu (VOJ), Južnu i Istočnu Srbiju (JIS) i Šumadiju i Zapadnu Srbiju (ŠZS).

Testovi jediničnog korena

Prisustvo jediničnog korena u vremenskim serijama može ugroziti statističko zaključivanje zasnovano na različitim statističkim metodama za analizu vremenskih serija. To je slučaj i sa testovima uzročnosti, tako da se mora odbaciti mogućnost da

Tabela 1 Hedonistički indeksi cena stanova, 2023Q4 (2017Q1=100)

Nacionalno i regionalna tržišta	Novogradnja (1)	Starogradnja (2)	Relativni rast u % (2/1)
Republika Srbija	163.01	198.13	21.54
Beogradski region	169.42	205.03	21.02
Vojvodina	171.80	223.61	30.16
Južna i Istočna Srbija	145.67	179.63	23.32
Šumadija i Zapadna Srbija	148.98	162.96	9.39

Tabela 2 Zbirna statistika skupa podataka (izvorni podaci; T=27)

	Sred. vr.	Maks.	Min.	St. dev.	Simetr.	Položen.
RS						
Novogradnja	1.83	2.94	0.89	0.50	0.72	3.09
Starogradnja	2.57	4.47	0.79	0.98	0.15	2.40
BEO						
Novogradnja	1.97	3.05	0.77	0.55	0.19	3.06
Starogradnja	2.70	4.51	0.77	1.01	-0.06	2.25
VOJ						
Novogradnja	2.03	2.94	0.80	0.55	-0.46	2.32
Starogradnja	3.03	4.81	0.33	1.14	-0.78	3.29
JIS						
Novogradnja	1.40	4.49	0.49	1.11	1.46	4.16
Starogradnja	2.20	4.79	0.71	1.25	0.67	2.43
ŠZS						
Novogradnja	1.49	2.68	0.53	0.64	0.41	2.26
Starogradnja	1.83	3.93	0.44	1.01	0.63	2.51

Izvor: Autori, na bazi RGZ (2024) baze podataka.

serije podataka sadrže jedinični koren. Primenjen je ADF test, koji su predložili D. Dickey i W. Fuller (1979), i PP test, predložen od P. Phillips i P. Perron (1988), da bi se proverilo prisustvo jediničnog korena (nestacionarnost) kao statističko obeležje koje je kritičan uslov za dalje modeliranje. Tim procedurama testirana je nulta hipoteza da svaka vremenska serija pojedinačno ima jedinični koren. Potvrđeno je da sve promenljive izražene kao izvorni podaci (kvartalne stope rasta) nisu stacionarne (rezultati testova nisu priloženi), tako da je procedura ponovljena sa prvim diferencama izvornih podataka. U Tabeli 3 prikazana je izračunata τ -statistika i njoj odgovarajuće p -vrednosti (u zagradama). Vrednosti označene zvezdicama ukazuju na slučajeve stacionarnosti. Na osnovu rezultata se može sa 95 procenata sigurnosti tvrditi da serije prvih diferenci ne sadrže jedinični koren.

Granger-ova uzročnost

Ovu statističku proceduru predložio je C. Granger (1969) za proveru statističke uzročnosti između para stacionarnih varijabli zapisanih kao vremenske serije. Sama procedura više testira da li promene u jednoj varijabli prethode promenama u drugoj testiranoj varijabli, nego što proverava postojanje uzročnosti u logičkom smislu. Na osnovu testa, ako prethodne

Tabela 3 Test jediničnog korena

		ADFT ¹⁾	PP τ ²⁾
RS	Prva diferenca		
	Novogradnja	-2.250090* (0.0262)	-2.333880* (0.0217)
	Starogradnja	-4.396232** (0.0001)	-1.813142 (0.0670)
BEO	Novogradnja	-2.570621* (0.0124)	-2.570621* (0.0124)
	Starogradnja	-3.124905** (0.0033)	-2.248598* (0.0263)
VOJ	Novogradnja	-2.964311** (0.0047)	-2.948069** (0.0049)
	Starogradnja	-2.412031* (0.0181)	-2.412031* (0.0181)
JIS	Novogradnja	-2.313167* (0.0231)	-3.8616** (0.0073)
	Starogradnja	-2.4711* (0.0158)	-2.4922* (0.0150)
ŠZS	Novogradnja	-3.167289** (0.0028)	-3.177429** (0.0027)
	Starogradnja	-2.464125* (0.0160)	-2.528307* (0.0138)

Napomene: ¹⁾ Augmented Dickey-Fuller procena sa konstantom, automatski izbor dužine kašnjenja, zasnovano na SIC, MacKinnon (1996) jednostrane p -vrednosti;

²⁾ Phillips-Perron procena sa konstantom, Bandwidth Newey-West uz upotrebu Bartlett kernel filtera; * Nulta hipoteza se odbacuju uz nivo značajnosti 5 procenata; ** Nulta hipoteza se odbacuju uz nivo značajnosti 1 procenat.

Izvor: Autori

vrednosti nezavisne varijable predviđaju tekuće ili buduće vrednosti zavisne varijable bolje nego prethodne vrednosti same zavisne varijable, zaključuje se da nezavisna varijable uzrokuje zavisnu varijablu u *Granger*-ovom smislu. Ovom procedurom proverava se nulta hipoteza (H_0) da ne postoji uzročnost. Ako se H_0 odbaci sa potrebnom statističkom pouzdanošću, zaključuje se da postoji uzročnost u testiranom smeru. Nakon toga se test ponavlja u suprotnom smeru, da bi se proverilo da li uzročnost između te dve varijable postoji u suprotnom smeru. Na taj način, za svaki par varijabli potrebno je testirati dve nulte hipoteze. Rezultati testa u kritičnoj meri zavise od izabrane dužine kašnjenja promena, tako da istraživači moraju da ponove proceduru onoliko puta koliko je potrebno da bi se utvrdio najadekvatniji period kašnjenja. U Tabeli 4 prikazane su izračunate *F*-vrednosti i njima pripisane *p*-vrednosti (u zagradama). Brojevi označeni zvezdicama obeležavaju slučajeve *Granger*-ove uzročnosti.

Granger-ovi linearni testovi uzročnosti (Tabela 4) potvrdili su statistički verodostojan slučaj jednosmerne uzročnosti od cena na sekundarnom ka cenama na primarnom tržištu stanova za nacionalno tržište i većinu regionalnih tržišta. Sa izuzetkom Beogradskog regiona, u ostalim regionima ne postoji dokaz obostrane uzročnosti između ova dva segmenta. Na osnovu sprovedenih testova izgleda da

sekundarno tržište pre nego primarno tržište predvodi u reakciji cena. Primarno tržište sledi obrazovanje i zaokrete trendova na sekundarnom tržištu i to sa kašnjenjem do četiri perioda. Jednogodišnje kašnjenje (četiri kvartalna perioda) najbolje odgovara svim regionima osim Vojvodine, gde su najbolji rezultati dobijeni za period kašnjenja od jednog kvartala. Za Vojvodinu su rezultati manje ubedljivi (deset procenata značajnosti). Izgleda da se slučaj Beogradskog regiona izdvaja od ostalih slučajeva. Iako je obostrana uzročnost potvrđena, uzročnost od primarnog ka sekundarnom tržištu stanova je u ovom slučaju uverljivija. Ovaj izuzetak zahteva posebnu pažnju. Beogradski region je bio lokacija izbora za gotovo četrdeset procenata svih stanova izgrađenih u grupi od 24 velika grada u Srbiji u 2021. godini. U istoj godini Beogradski region je držao polovinu nacionalnog tržišta stanova po broju realizovanih kupoprodajnih transakcija i čak 63 procenata po ukupnom prometu. Time se pozicionirao kao daleko najaktivnije tržište i u isto vreme tržište sa najjačim uticajem novogradnje na opšti nivo cena stanova. Zbog toga se može pretpostaviti da ovo regionalno tržište ima izvesne uticaje na ostala regionalna tržišta.

Primena prethodne procedure (Tabela 4) polazi od pretpostavke da sile prilagođavanja mogu delovati na usklađivanje cena između segmenata, i da te sile deluju samo unutar prostornih granica regiona. Pored

Tabela 4 Rezultati *Granger*-ovog testa uzročnosti - Cene novogradnje (*y*)

Cene starogradnje (<i>x</i>)	Kašnjenje	H_0 : <i>x</i> ne uzrokuje <i>y</i>	Kašnjenje	H_0 : <i>y</i> ne uzrokuje <i>x</i>
Prva diferencija				
Republika Srbija	4	8.6734*** (0.0031)	4	1.4740 (0.2585)
Beogradski region	4	3.3096* (0.0645)	4	8.4806*** (0.0031)
Vojvodina	1	3.1687* (0.0662)	1	0.9689 (0.3975)
Južna i Istočna Srbija	4	10.1730*** (0.0016)	4	1.2365 (0.3167)
Šumadija i Zapadna Srbija	4	6.8626*** (0.0077)	4	1.9368 (0.1765)

Napomene: * Nulta hipoteza se odbacuje uz 10 procenata statističke značajnosti; ** Nulta hipoteza se odbacuje uz 5 procenata statističke značajnosti; *** Nulta hipoteza se odbacuje uz 1 procenat statističke značajnosti.

Izvor: Autori

toga, sprovedeni su i drugi testovi kako bi se proverilo da li takvi procesi postoje i između tržišta različitih regiona. Naime, stambene usluge, time što su vezane za lokaciju (kamp kuće su izuzetak), mogu se koristiti ukoliko ih prati promena lokacije stanovnika, koja je, sama po sebi, uglavnom (ali ne i u potpunosti) motivisana potragom za dohotkom (zaposlenje ili privatni posao), lanac stambenih supstituta za kupce je ograničen vremenom putovanja ili udaljenošću od mesta poželjne lokacije (Blank & Winnick, 1953). Ova ograničenja postavljaju prostorne granice tržišta i stvaraju prostorno razgraničenje tržišta stanova. Međutim, ovo je u potpunosti tačno samo ukoliko stan posmatramo kao potrošno dobro, tj. ukoliko kupujemo stan da bi u njemu i živeli. Ukoliko neko o stanu razmišlja kao investiciji, onda lokacija stana može biti i udaljena od lokacije koja je kupcu poželjna za život, ali će i dalje važiti bliska povezanost lokacije stana sa potencijalima sredine u kojoj je lociran stan da kreira dohodak i radna mesta (Marinković *et al*, 2024). Imajući u vidu investicionu namenu stanova, svi stanovi se mogu posmatrati kao bliski supstituti, pa i prostorne granice tržišta stanova neće biti tako čvrste. Najverovatnija je pretpostavka da trend cena na beogradskom tržištu utiče na trendove u ostalim regionima. Obavili smo testove izdvojeno za tržište novogradnje (Tabela 5) i tržište starogradnje (Tabela 6). Kao i u prethodnom slučaju, proverili smo i obratnu uzročnost, mada je taj smer uzročnosti manje verovatan.

Rezultati testova (Tabela 5) potvrđuju da promene

cena novogradnje u Beogradskom regionu prethode istosmernim promenama cena u ostalim regionima. To ukazuje da cene u Beogradu mogu imati izvestan uticaj na cene na ostalim regionalnim tržištima, pri čemu je uticaj najsnažniji (najpouzdaniji) u Vojvodini i postepeno slabi u dva južna regiona. Isto važi ukoliko poredimo period kašnjenja. Najbrži prenos uticaja je utvrđen u Vojvodini, dok je u ostalim regionima potrebno više vremena da se ispolji reakcija.

Naredni testovi (Tabela 6) analiziraju cene u starogradnji. Jasni slučajevi uzročnosti koji se pojavljuju između beogradskog tržišta i ostalih regionalnih tržišta kada se bavimo cenama novogradnje, u ovom slučaju nisu tako uočljivi. Samo se u slučaju Vojvodine, i u manjoj meri Šumadije i Zapadne Srbije, potvrdilo da lokalne cene reaguju na cene u Beogradu. Ovo su regioni koji se graniče sa regionom Beograda, pa je verovatnije da arbitraža između tržišta koju bi sprovodili kupci postigne prostorno usklađivanje promena cena. Na tržištu novogradnje odluke o cenama koje donose investitori su značajnije u procesu formiranja cena, a investitori su kolektivitet koji je pokretljiviji u prostoru. Investitori sa više slobode biraju lokacije za gradnju nego što kupci stanova biraju lokacije za život. Razlike u uzročnosti koje smo utvrdili testirajući uporedo tržište novogradnje i tržište starogradnje mogu se objasniti pretpostavkom da se veliki deo nacionalne investicione i spekulativne tražnje za stanovima usmerava u novogradnju na beogradskom tržištu, kao

Tabela 5 Rezultati *Granger*-ovog testa uzročnosti - Cene novogradnje u Beogradu (*y*)

Cene novogradnje (<i>x</i>)	Kašnjenje	H_0 : <i>x</i> ne uzrokuje <i>y</i>	Kašnjenje	H_0 : <i>y</i> ne uzrokuje <i>x</i>
Prva diferenca				
Vojvodina	1	0.3297 (0.7231)	1	8.2075*** (0.0027)
Južna i Istočna Srbija	2	1.1919 (0.3253)	2	4.4446** (0.0280)
Šumadija i Zapadna Srbija	4	1.3385 (0.2901)	4	2.7910* (0.0912)

Napomene: * Nulta hipoteza se odbacuje uz 10 procenata statistične značajnosti; ** Nulta hipoteza se odbacuje uz 5 procenata statistične značajnosti; *** Nulta hipoteza se odbacuje uz 1 procenat statistične značajnosti.

Izvor: Autori

Tabela 6 Rezultati *Granger*-ovog testa uzročnosti - Cene starogradnje u Beogradu (y)

Cene starogradnje (x)	Kašnjenje	$H_0: x$ ne uzrokuje y	Kašnjenje	$H_0: y$ ne uzrokuje x
Prva diferencija				
Vojvodina	2	3.7925** (0.0422)	2	5.6926** (0.0121)
Južna i Istočna Srbija	4	2.0795 (0.1556)	4	0.6865 (0.5185)
Šumadija i Zapadna Srbija	3	1.3802 (0.2783)	3	3.3065* (0.0612)

Napomene: * Nulta hipoteza se odbacuje uz 10 procenata statistične značajnosti; ** Nulta hipoteza se odbacuje uz 5 procenata statistične značajnosti; *** Nulta hipoteza se odbacuje uz 1 procenat statistične značajnosti.

Izvor: Autori

glavnom tržištu u Srbiji. Zbog ovoga će arbitraža koju sprovode kupci stanova verovatno potpunije delovati u segmentu novogradnje.

Na osnovu nalaza mogu se sumirati izvesna objašnjenja u vezi redosleda uticaja između tržišnih segmenta. Kako se većina stanova u novogradnji proda u ranijim fazama izgradnje, a imajući u vidu relativno skroman nivo aktivnosti stanogradnje, nezadovoljena tražnja završava na sekundarnom tržištu podižući cene. Taj višak tražnje zagreva najpre sekundarno tržište sa tendencijom da se prelije i na primarno tržište i cene u novogradnji. Ovakav redosled će kreirati zajedničke obrasce u kretanju cena na ova dva segmenta tržišta, pri čemu će cene u novogradnji zaostajati za cenama starogradnje. Ovakvo tumačenje treba ipak uzeti sa oprezom. Naime, ova uočena pravilnost se bar jednim delom može objašnjavati jednom činjenicom koja je više tehničke prirode. Činjenica je da se veliki deo novogradnje prodaje po ranije utvrđenim cenama, na osnovu predugovora, tj. u ranijim fazama izgradnje, ali se transakcije zvanično registruju nakon okončanja gradnje, na bazi konačnog ugovora, sa kašnjenjem koje može dostići i ukupno vreme proizvodnje stanova, tako da neke registrovane cene novogradnje odražavaju prethodne uslove na tržištu.

Da li je moguće hlađenje tržišta stanova u Srbiji? Ako jeste, gde bi krenulo? Pretpostavimo da dođe do slabljenja tražnje za stanovima. Na primarnom

tržištu bi došlo do pada prodaje, sa potencijalom da to dalje izazove pad cena i/ili pad ponude. Za datu strukturu industrije stanogradnje pad proizvodnje, odnosno ponude je verovatniji scenario. Ukoliko dođe do izvesnog pada cena on će se prelići na sekundarno tržište. Međutim, ako se to dogodi, nije izvesno da bi se pad cena nastavio dovoljno dugo da dovede do značajnih korekcija cena naniže. Visoka cenovna elastičnost novogradnje bi verovatno zadržala dalji pad cena. Ako prihvatimo da tekući nivo cena stanova ugrožava pristupačnost stanova prosečnom domaćinstvu, u pogledu poželjne politike, nalazi u radu preporučuju mere kojima bi se stimulisala gradnja stanova i sprečavali šokovi sa strane tražnje stanova. Na prvi cilj bi se moglo delovati različitim merama. Na primer, teorija razvoja urbanih područja (Caldera & Johansson, 2011) ukazuje na povoljne uticaje mera kojima se suočavamo sa fizičkom ograničenošću zemljišta raspoloživog za stanogradnju, ograničavajućom regulativom o upotrebi zemljišta, obezbeđenjem infrastrukture i ostalih javnih usluga potrebnim za stanovanje, kao i stepenom konkurencije u oblasti industrije stanogradnje. Ove mere utiču na reagibilnost ponude stanova na cene u oblastima sa gustom naseljenošću, pre svega velikim gradovima. Upravo se neelastična ponuda stanova smatra glavnim uzrokom za nastajanje cenovnih mehurova na tržištu stanova (Glaeser, Gyourko & Saiz, 2008). Postizanje drugog cilja zahteva kontrolu inflacije i delovanje u pravcu promocije finansijskih alternativa za zaštitu od rizika

inflacije, tj. modalitete u oblasti finansijskih investicija koji bi mogli ponuditi prinose koji su uporedivi sa investicijama u nekretnine.

ZAKLJUČAK

U radu je istražena dinamika cena na tržištu stanova u Srbiji. Podaci potvrđuju da se u srednjem roku cene novogradnje mogu sistematski razlikovati od cena starogradnje, čak iako se koriste podaci koji obezbeđuju da kvalitet stanova ne utiče na cenu. Proces prilagođavanja cena između segmenata novogradnje i starogradnje je bio nesavršen i stvarao je ne samo sporo nego i nepotpuno usklađivanje cena između ova dva segmenta tržišta stanova. To je verovatno zaslužno za postepeno udaljavanje cena starogradnje od cena novogradnje. Trend koji se održavao poslednjih sedam godina doveo je do precenjenosti starogradnje u odnosu na novogradnju za više od dvadeset procenata, sa uočljivim razlikama među regionima. U radu je primenjen *Granger-ov* linearni test uzročnosti na parovima indeksa cena stanova prilagođenih za razlike u kvalitetu stanova, testirajući nulte hipoteze da uzročnost ne postoji. *Granger-ovi* testovi uzročnosti potvrdili su statističku pouzdanost jednosmerne uzročnosti od cena starogradnje ka cenama novogradnje za nacionalno tržište stanova i sve regione izuzev Beogradskog regiona, koji pokazuje obostranu uzročnost, sa čak nešto pouzdanijim slučajem obrnute uzročnosti. Dakle, izgleda da sekundarno tržište, a ne primarno, prvo reaguje promenom cena. U većini regionalnih tržišta, primarno tržište sledi obrazovanje i zaokrete trendova sa sekundarnog tržišta, i to uz kašnjenje od maksimalno četiri kvartala. Kada je u pitanju novogradnja, *Granger-ovi* testovi uzročnosti obavljani da bi se proverilo da li postoji povezanost u kretanjima cena između regionalnih tržišta potvrdili su pretpostavljen smer uzročnosti sa beogradskog tržišta na ostala regionalna tržišta. Rezultati testova povezanosti regionalnih tržišta starogradnje dali su mešovite rezultate. U pogledu poželjne politike, nalazi u radu preporučuju mere kojima bi se stimulisala gradnja stanova i sprečavali šokovi sa strane tražnje stanova.

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ENDNOTE

- Po srpskim računovodstvenim propisima to je trenutno 2,5% godišnje.
- Prosečno vreme potrebno za prodaju stana u Nišu uz posredovanje agencije 4zida je 51 dan nakon objave ponude, odnosno prvog pojavljivanja na tržištu.
- U određenoj meri investitori igraju izvesnu ulogu u ublažavanju intertemporalnih promena cena, što je uloga market mejkera. Podižući nivo zalihe stanova, odlaganjem prodaje, u situacijama kada su cene niske i očekuje se njihov rast, ili prodajući stanove pre okončane izgradnje kada cene smatraju visokim, investitori deluju u pravcu ublažavanja oscilacija cena.
- Mada nisu profesionalni trgovci, kupci "ranoranioci" su specifična vrsta spekulanta na tržištu stanova. Oni kupuju unapred i dele rizik sa glavnim investitorom. Pozicija ovakvih kupaca-investitora je prilično složena, ali svakako uključuje i spekulaciju na intertemporalnim promenama cena. Neki akteri više puta ponavljaju kupovinu nakon koje sledi prodaja, sa ciljem da zarade na popustima koje glavni investitori nude za rane kupovine. Sličnu ulogu igraju i podizvođači ukoliko su za izvršene usluge plaćeni kompenzacijom za stanove u procesu gradnje.
- Procenjuje se da se na tržištu Srbije polovina ukupnog prometa stanova realizuje u novogradnji.
- Ovi troškovi deluju neposrednije u slučaju da transakcije realizuje vlasnik koji sam koristi stanove, ali čak i kod stanova koji se kupuju radi izdavanja troškovi preseljenja mogu igrati

ulogu, jer mogu uticati na spremnost zakupaca da plate određenu cenu rente, pa samim tim i na cenu koju je kupac spreman da plati.

- 7 Prodaja stana nakon koje sledi kupovina drugog stana, ili obrnuto, neposredno ili u kratkom roku, ako se obavlja sa ciljem da se iskoristi neopravdana razlika u cenama tih stanova je u stvari trgovina koja podseća na arbitražu. Takvom trgovinom se mogu “vezivati” stanovi na različitim segmentima tržišta ili stanovi na istom segmentu.

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Ognjen Radović je redovni profesor na Ekonomskom fakultetu Univerziteta u Nišu. Predaje Informatiku, Poslovne informacione sisteme i Elektronsko poslovanje na Ekonomskom fakultetu Univerziteta u Nišu. Do sada je učestvovao na mnogim međunarodnim i nacionalnim konferencijama. Kao autor ili koautor, objavio je značajan broj radova. Njegovi istraživački interesi obuhvataju modeliranje i simulaciju zasnovanu na agentima, kvantitativne metode i modele u finansijama i ekonomiji, analizu vremenskih serija i elektronsko poslovanje.

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THE HOUSING MARKET IN SERBIA - SEGMENTATION, ARBITRAGE AND OVERVALUATION

Srđan Marinković, Ognjen Radović and Jelena Radojičić

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The paper discusses market trends and analyzes the regularities that appear on the Serbian national housing market and regional submarkets. It is assumed that, apart from the common market driving forces, the market for newly constructed houses and the market for the existing housing stock behave like two separate segments of the housing market with the imperfect adjustment of prices. The prime focus of the analysis is on the divergence between the prices in those two segments, with a special interest in the process of mutual adjustments. Granger causality tests are employed in order to reveal whether there is a causal relationship between the price indices in those two segments and it has been found that there is a causality relation between the existing housing market and the newly constructed house market prevailing among the regional submarkets. The same methodology is applied to test if there is any such causality between the regional markets. The results have confirmed a likely influence of the Belgrade new construction market on the other regional markets. The findings will help understand the process of price adjustments between the two market segments and will lead to policy recommendations.

Keywords: regional housing markets, Granger causality, market efficiency, urban development

JEL Classification: R31, R21, G51, C32

Izvorni naučni članak

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DETERMINANTE NASTUPANJA FINANSIJSKIH NEPRILIKA KOD SREDNJIH I VELIKIH JAVNIH AKCIONARSKIH DRUŠTAVA

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Predviđanje finansijskih teškoća u kompanijama je veoma značajno, imajući u vidu kompleksnost i dinamičnost savremenog poslovnog okruženja. Shodno tome, predmet istraživanja u radu su ključne determinante nastupanja finansijskih neprilika, koje mogu dovesti i do stečaja kompanija. Cilj istraživanja je utvrđivanje međuzavisnosti (korelacije) pojedinih determinanti nastupanja finansijskih neprilika i pokazatelja verovatnoće nastupanja finansijskih neprilika, kao i utvrđivanje razlike u verovatnoći nastupanja finansijskih neprilika pre i nakon pojave pandemije izazvane virusom COVID-19 u Republici Srbiji. Istraživanje je sprovedeno na uzorku od 73 javna akcionarska društava, od kojih 22 pripada grupi velikih, a 51 grupi kompanija srednje veličine, tokom perioda 2018-2022. Rezultati istraživanja su pokazali da postoji statistički značajna negativna korelacija determinanti profitabilnosti, likvidnosti i solventnosti i verovatnoće nastupanja finansijskih neprilika. Takođe, pokazali su da postoji statistički značajna pozitivna korelacija leveridža i verovatnoće nastupanja finansijskih neprilika, kao i između rasta kompanije i pokazatelja *Altman*-ovog *Z-score*-a. Došlo se i do zaključka da postoji statistički značajna razlika u vrednosti pokazatelja *Altman*-ovog *Z-score*-a pre i nakon pojave pandemije izazvane virusom COVID-19.

Ključne reči: finansijske neprilike, stečaj, *Altman*-ov *Z-score*, COVID-19

JEL Classification: M41, G32, G33

UVOD

Svako privredno društvo, nezavisno od veličine i delatnosti kojom se bavi, nastoji da predvidi svoje poslovanje i uslove odvijanja poslovne delatnosti.

Ono što kompanije posebno interesuje jeste koliko će uspešne biti u otklanjanju rizika koji prete da u budućnosti ugroze njihovo poslovanje. Drugim rečima, kompanije su veoma zainteresovane za predviđanje i upravljanje faktorima koji mogu dovesti do poslovnog neuspeha i, eventualno, stečaja. Odluke o prekidu poslovanja zasnivaju se na očekivanim prinosima i sposobnosti kompanije da pokrije svoje varijabilne

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troškove. Treba napomenuti da kompanija može biti u finansijskim teškoćama dugi niz godina, ali nikada ne sme propustiti da izmiri svoje tekuće obaveze. Ukoliko nije u prilici da izmiruje obaveze o rokovima dospeća, tada mogu nastati krupni finansijski problemi za kompaniju (Altman & Hotchkiss, 1993). Postoje brojni razlozi za nastupanje poslovnog neuspjeha, od kojih A. S. Dewing (1926) izdvaja četiri: prekomerna konkurencija, neprofitabilna ekspanzija, prestanak tražnje za proizvodima ili uslugama kompanije i prekomerno plaćanje kapitalnih izdataka. Nešto drugačije shvatanje procesa razvoja finansijskih neprilika u kompanijama jeste da su kompanije u finansijskim teškoćama prošle kroz četiri faze pogoršanja poslovanja pre proglašenja bankrota, a to su: inkubacija, nedostatak gotovine, finansijska i potpuna nesolventnost (Newton, 1975).

Veoma je značajno uzeti u obzir i statističke podatke o broju aktivnih stečajnih postupaka u Republici Srbiji u periodu od 2018. do 2022. godine, budući da je upravo taj period obuhvaćen u radu. Naime, podaci Agencije za licenciranje stečajnih upravnika ukazuju na veliki broj stečajnih postupaka, ali, takođe, ukazuju na smanjenje njihovog broja u periodu od 2018. do 2022. godine (broj stečajnih postupaka posmatran je na kraju poslovne godine). Na sajtu Agencije za licenciranje stečajnih upravnika je navedeno da je krajem 2018. godine bilo 2.101 aktivni stečajni postupak, u 2019. godinje taj broj iznosio 2.057, u 2020. godini je bilo 1.916 aktivnih postupaka, u 2021. godini 1.760, dok je krajem 2022. godine bilo 1.719 aktivnih stečajnih postupaka.

Predmet istraživanja u radu su ključne determinante nastupanja finansijskih neprilika, koje mogu dovesti i do stečaja kompanija, pri čemu će istraživanjem biti obuhvaćena sva srednja i velika javna akcionarska društva na teritoriji Republike Srbije. Treba imati u vidu da je veoma kompleksno pitanje sagledavanja faktora koji kompanije dovode u nepovoljan finansijski položaj, jer je broj faktora koji dovode do teškoća finansijske prirode jako veliki, pa je gotovo nemoguće obuhvatiti ih sve. Međutim, moguće je sagledati ključne determinante na osnovu kojih se može predvideti nastupanje finansijskih neprilika.

U mnogim studijama sprovedenim u Republici Srbiji i susednim zemljama korišćen je *Altman-ov Z-score* u cilju predviđanja nastupanja finansijskih neprilika kompanija različitih delatnosti (Ivaniš & Popović, 2013; Milašinović, Knežević & Mitrović, 2019; Knežević Špiler, Milašinović, Mitrović, Milojević & Travica, 2021; Kozarević & Pirić, 2022; Milić, Tekić, Novaković, Zekić, Popov & Mihajlov, 2022), ali je znatno manji broj radova koji se bave analizom determinanti nastupanja finansijskih neprilika kod javnih akcionarskih društava u Republici Srbiji, kao i onih radova koji se bave poređenjem verovatnoće nastupanja finansijskih neprilika ovih kompanija pre i nakon pojave pandemije izazvane virusom COVID-19. Poznato je da je pandemija izazvana virusom COVID-19 uticala ne samo na zdravlje ljudi, već i na poslovanje kompanija i funkcionisanje privreda zemalja, pa je veoma značajno sagledati promene koje je pandemija izazvala kada je u pitanju verovatnoća nastupanja finansijskih neprilika kod posmatranih kompanija. Prethodno navedene činjenice predstavljaju određeni istraživački jaz koji će autori ovim istraživanjem nastojati da otklone. Zbog toga, cilj rada je utvrđivanje međuzavisnosti (korelacije) pojedinih determinanti nastupanja finansijskih neprilika i pokazatelja verovatnoće nastupanja finansijskih neprilika, kao i utvrđivanje razlike u verovatnoći nastupanja finansijskih neprilika pre i nakon pojave pandemije izazvane virusom COVID-19 u Republici Srbiji.

Na osnovu definisanog predmeta i cilja istraživanja u radu su formulisane sledeće istraživačke hipoteze:

- H1: Postoji statistički značajna negativna korelacija verovatnoće nastupanja finansijskih neprilika i profitabilnosti;
- H2: Postoji statistički značajna negativna korelacija verovatnoće nastupanja finansijskih neprilika i likvidnosti;
- H3: Postoji statistički značajna negativna korelacija verovatnoće nastupanja finansijskih neprilika i solventnosti;
- H4: Između leveridža i verovatnoće nastupanja finansijskih neprilika postoji statistički značajna pozitivna korelacija;

H5: Postoji statistički značajna negativna korelacija *Altman*-ovog *Z-score*-a i rasta kompanije;

H6: Postoji statistički značajna razlika u vrednosti *Altman*-ovog *Z-score*-a pre i nakon pojave pandemije izazvane virusom COVID-19.

Istraživanje sprovedeno u radu obuhvata sva velika i srednja (veličina je utvrđena na osnovu kriterijuma prema Zakonu o računovodstvu) javna akcionarska društva na teritoriji Republike Srbije, odnosno 22 velika i 51 srednje javno akcionarsko društvo u periodu od 2018. do 2022. godine. U radu su, pored kvantitativnih metoda (deskriptivna statistika, korelaciona statistička analiza i Wilcoxon-ov test rangova sa znakom), korišćene i kvalitativne metode (indukcija, dedukcija, analiza, sinteza i apstrakcija).

Pored Uvoda i Zaključka, rad je strukturiran iz tri dela. U prvom delu je predstavljen Pregled literature. U drugom delu dat je Pregled metodologije koja je u radu korišćena. Treći deo sadrži Rezultate empirijskog istraživanja i diskusiju rezultata.

PREGLED LITERATURE

Termin „finansijska neprilika“ je uopšten i pomalo nejasan. Uopšteno govoreći, taj termin se odnosi na nemogućnost plaćanja obaveza (na primer, duga) o rokovima njihovog dospeća (Gilson, Kose & Lang, 1990). Operativne definicije finansijskih teškoća fokusirane su na dva glavna događaja: neplaćanje obaveza po osnovu obveznica i bankrot. Oba događaja su poznata javnosti i datumi kada su se desili poznati su sa određenom preciznošću (Beaver, Correia & McNichols, 2011). Kontinuirani razvoj konceptualno bogatijih i tačnijih modela predviđanja finansijskih neprilika je od značaja za regulatore, praktičare i akademike (Shumway, 2001). U poslednje vreme, sa razvojem informacionih tehnologija, mašinskog učenja i veštačke inteligencije, nova oblast digitalne analize podataka počela je da se pojavljuje i brzo razvija, što je doprinelo ubrzanom razvoju metoda kojima se mogu predvideti i finansijske neprilike kompanija (Sun & Li, 2008).

U nastavku sledi pregled pojedinačnih determinanti na osnovu kojih su u radu i formulisane istraživačke hipoteze, na osnovu prethodno sprovedenih istraživanja. Pritom, svaka determinanta, kao što se može i primetiti iz formulisanih hipoteza ima određenu međuzavisnost sa pokazateljima koji ukazuju na mogućnost nastupanja finansijskih neprilika.

Profitabilnost

Profitabilnost se može definisati kao konačna mera ekonomskog uspeha koju ostvaruje kompanija u odnosu na uloženi kapital (Andriani, Nurnajamuddin & Rosyadah, 2021). Profitabilnost je primarni cilj svih kompanija i bez profitabilnosti kompanija ne može opstati u dužem vremenskom periodu (Khan & Raj, 2020). Najčešće se za merenje profitabilnosti koristi ROA racio (Return On Assets) (Ohlson, 1980; Lo, 1986; Gombola, Haskins, Ketz, & Williams, 1987). Međutim, podjednako je pogodno koristiti i ROE racio (Return On Equity), koji meri finansijski uspeh sa stanovišta vlasnika a koji su u svom istraživanju finansijskih neprilika koristili B. Kollár i Z. Sojková (2015). Prinos na ukupnu aktivu (ROA) predstavlja količnik neto rezultata i ukupne aktive kompanije, dok prinos na sopstveni kapital (ROE) predstavlja količnik neto rezultata i sopstvenog kapitala kompanije (Račić, Barjaktarović & Zeremski, 2011).

J. Y. Campbell, J. Hilscher i J. Szilagyi (2008) su proučavali determinante neuspeha kompanija i određivanje cena akcija u finansijskim problemima primenom statističkih modela. Došli su do zaključka da će niža profitabilnost dovesti do većeg nivoa finansijskih problema koji povećavaju šansu da se kompanija nađe u situaciji bankrotstva. Takođe, u istraživanju koje su sprovedeli C. K. Thim, Y. V. Choong i C. S. Nee (2011) došli su do zaključka da postoji statistički značajna negativna korelacija profitabilnosti (merene preko pokazatelja ROA) i verovatnoće nastupanja finansijskih neprilika (merene preko *Altman*-ovog *Z-score*-a). Studija koju su sprovedeli E. Masdupi, A. Tasman i A. Davista (2018) na uzorku indonežanskih kotiranih kompanija, pokazuje da postoji negativna korelacija profitabilnosti i

verovatnoće nastupanja finansijskih neprilika. Zatim, R. A. Dwiantari i L. G. S. Artini (2021) u svom radu navode postojanje negativne korelacije pokazatelja profitabilnosti i mogućnosti nastupanja finansijskih neprilika.

Likvidnost

Likvidna imovina se generalno smatra podrškom protiv kriza, jer omogućava kompanijama da uštede sredstva tako što nisu u obavezi da prodaju imovinu u nepovoljnim situacijama radi plaćanja duga (Shleifer & Vishny, 1992). Likvidnost će se u radu meriti pomoću tri racio broja, i to: racio opšte (ROL), rigorozne (RRL) i gotovinske likvidnosti (RGL). Racio opšte likvidnosti (Current ratio) predstavlja količnik obrtne imovine i kratkoročnih obaveza, dok se racio rigorozne likvidnosti (Quick ratio) dobija iz odnosa obrtne imovine umanjene za vrednost zaliha (takozvana relativno likvidna imovina) i iznosa kratkoročnih obaveza, a racio gotovinske likvidnosti (Liquid ratio) se predstavlja količnikom iznosa gotovine i kratkoročnih obaveza (Saleem & Rehman, 2011).

Može se konstatovati da likvidna sredstva omogućavaju kompanijama da izbegnu veće troškove drugih izvora sredstava za finansiranje svojih aktivnosti i ulaganja (Mikkelson & Partch, 2003). A. W. Butler, G. Grullon i J. P. Weston (2005) su otkrili da su naknade koje naplaćuju investicione banke niže za kompanije sa likvidnijim kapitalom. Studija je pokazala da su troškovi finansijskih teškoća u inverznom odnosu sa držanjem likvidnih sredstava. Rezultati istraživanja koje su sproveli O. S. Desiyanti, W. Soedarmono, K. Chandra i K. Kusnadi (2019) jasno ukazuju na činjenicu da postoji statistički značajna negativna korelacija racija pokazatelja likvidnosti i verovatnoće nastupanja finansijskih neprilika. C. K. Thim *et al* (2011) su u rezultatima svog rada naveli da su otkrili statistički značajnu negativnu korelaciju likvidnosti i verovatnoće nastupanja finansijskih neprilika u kotiranim kompanijama. N. Kim-Soon, A. A. E. Mohammed i F. K. M. Agob (2013) su u svom istraživanju, koje je sprovedeno na uzorku sastavljenom od kotiranih kompanija, otkrili

da postoji statistički značajna negativna korelacija pokazatelja likvidnosti i mogućnosti nastupanja finansijskih neprilika.

Solventnost

Imajući u vidu da likvidnost predstavlja sposobnost kompanije da izmiruje svoje obaveze o rokovima dospeća, solventnost se često naziva „dugoročnom likvidnošću“. Naime, racio analiza solventnosti u osnovi ima sagledavanje solventnosti koja predstavlja dugoročnu vitalnost kompanije (Wild, Subramanyam & Halsey, 2007). Racio solventnosti predstavlja količnik sopstvenog i pozajmljenog kapitala (Obradović, 2021).

Racio solventnosti može biti korišćen za merenje ozbiljnosti finansijskih teškoća (James, 1996). M. Harris i A. Raviv (1990) sugerišu da je leveridž obrnuto povezan sa racio pokazateljem solventnosti i tvrde da će povećanje duga uzrokovati veću verovatnoću neizvršenja obaveza. C. K. Thim *et al* (2011) u svom istraživanju sprovedenom na kotiranim kompanijama ističu da postoji statistički značajna negativna korelacija racio pokazatelja solventnosti i verovatnoće nastupanja finansijskih neprilika u kompanijama. K. Amoa-Gyarteng (2021) u sprovedenom istraživanju koje je obuhvatalo kompanije iz SAD, takođe iznosi stav da je između racio pokazatelja solventnosti i verovatnoće nastupanja finansijskih neprilika identifikovana statistički značajna negativna korelacija. L. C. Megasanti i H. E. Riwayati (2023) u svojoj studiji navode da su došli do zaključaka o postojanju negativne korelacije racio pokazatelja solventnosti i verovatnoće nastupanja finansijskih neprilika.

Leveridž

Leveridž pokazuje uticaj duga na stope ulaganja i mogućnosti ulaganja u kompanije u kojima će nivo duga indirektno uticati na interesovanje i poverenje investitora u kompanije (Rohmadini, Saifi & Darmawan, 2018). Visok ili nizak dug kompanije će uticati na veličinu rizika od finansijskih neprilika koje mogu nastupiti u kompaniji. Odnos duga i kapitala

(Debt to Equity Ratio - DER) je odnos koji se koristi za procenu leveridža kompanije. Prema tumačenju A. Dirman-a, ovaj odnos se dobija upoređivanjem svih dugova, uključujući tekući dug, sa ukupnim kapitalom, odnosno ukupnom pasivom, koja je u iznosu jednaka ukupnoj aktivi (Dirman, 2020).

Ako kompanija nema dovoljno visoke prihode, vrlo je verovatno da će lako doći u situaciju u kojoj će se javiti finansijske teškoće (Gobenvy, 2014). A. Rohmadini *et al* (2018) su u svom istraživanju, između ostalog, pronašli rezultate da leveridž utiče na finansijske probleme, u smislu da postoji pozitivna korelacija leveridža i verovatnoće nastupanja finansijskih neprilika. S. M. K. Rahman, M. K. Islam i M. M. Hossain (2021) u istraživanju koje je obuhvatilo proizvodne kompanije, ukazuju na pozitivnu korelaciju leveridža i verovatnoće nastupanja finansijskih neprilika. A. Dirman (2020) je, istražujući međuzavisnost leveridža i verovatnoće nastupanja finansijskih neprilika, došla do zaključka da leveridž nema negativnu korelaciju sa verovatnoćom nastupanja finansijskih neprilika, odnosno da postoji pozitivna veza leveridža i mogućnosti nastupanja finansijskih neprilika kompanije.

Rast kompanije

Kada je reč o rastu kompanije, može se govoriti o različitim vidovima rasta, kao što su tržišni rast, finansijski rast, rast sa aspekta veličine ili profitabilnosti i drugi. U radu će se o rastu kompanije govoriti isključivo kao o rastu sa aspekta profitabilnosti. Shodno navedenoj konstataciji, rast će biti kvantifikovan tako što će se u obzir uzeti promena poslovnog dobitka (operating profit) u tekućoj u odnosu na prethodnu godinu, što su u svom radu koristili C. K. Thim *et al* (2011).

O. Yosha (1995) je sugerisao da kompanije sa potencijalno vrednim budućim projektima rasta neće podizati dug po osnovu emisije hartija od vrednosti (dužničkih) zbog visokih troškova obelodanjivanja osetljivih informacija. Takođe, J. K. MacKie-Mason (1990) objašnjava da kompanije koje intenzivno rade na istraživanju i razvoju treba da izbegavaju izdavanje dužničkih hartija od vrednosti. Dakle, trebalo bi da

postoji negativan odnos rasta i finansiranja dugom. To znači da će se kompanije sa visokim rastom suočiti sa nižim nivoom pokazatelja *Altman*-ovog *Z-score*-a (negativna korelacija rasta i *Altman*-ovog *Z-score*-a) jer angažuju manje finansiranja dugom. Dakle, tekućim zaduživanjem se relaksira trenutna situacija, ali se otežava budući položaj kompanije, zbog čega je peta istraživačka hipoteza i postavljena tako da kompanije koje beleže izvestan rast imaju veću verovatnoću nastupanja finansijskih neprilika u budućnosti, odnosno niže vrednosti *Altman*-ovog *Z-score*-a. Pod pretpostavkom da su kompanije jedinstvene po pitanju budućnosti, kao i trenutnih finansijskih problema, postoji velika šansa da će kompanije sa velikim očekivanim mogućnostima rasta zadržati niskorizični kapacitet duga kako bi izbegle finansiranje budućih investicija ponudom kapitala ili propuštanje investicija (Morri & Cristanziani, 2009). C. K. Thim *et al* (2011) ističu da rast kompanije ima statistički značajnu negativnu korelaciju sa pokazateljima *Altman*-ovog *Z-score*-a.

Pandemija izazvana virusom COVID-19

Kompanije u kojima su se pojavile finansijske teškoće izazvane pandemijom COVID-19 zahtevaju korektivne korake koji su prilagođeni uslovima krize izazvane pandemijom, ali i koji će kompanijama omogućiti da nastave sa funkcionisanjem i unapređivanjem poslovanja, kako bi se poboljšale performanse kompanija u budućnosti (Marginingsih, 2022). Ograničenja aktivnosti zajednice zbog ograničenja pandemije COVID-19 izazvala su ekonomske gubitke na nacionalnom nivou (Hadiwardoyo, 2020).

Prema rezultatima nedavno sprovedenog istraživanja koje je vršeno na uzorku od 27 kompanija iz Indonezije (Rahmah & Novianty, 2021), došlo se do zaključka da postoje statistički značajne razlike u vrednosti *Z-score*-a između perioda pre i tokom pandemije COVID-19. Slično istraživanje sprovedeno nad kotiranim kompanijama u Kini dalo je slične rezultate, odnosno da je pandemija COVID-19 imala značajan uticaj na poslovanje analiziranih kompanija (Rababah, Al-Haddad, Sial, Chunmei & Cherian, 2020). Na osnovu istraživanja koje su nad kompanijama

u Nigeriji sprovedi H. O. Aifuwa, A. Saidu i S. A. Aifuwa (2020), može se zaključiti da su rezultati linearne regresije u ovoj studiji otkrili da je pandemija virusa COVID-19 štetna za finansijske i nefinansijske performanse privatnih kompanija u Nigeriji. Rezultati istraživanja koje je sprovedla R. Marginingsih (2022) ukazuju na povećanu verovatnoću nastupanja finansijskih neprilika (smanjenje pokazatelja *Z-score-a*) u periodu nakon pojave pandemije. N. Fitria, H. Putri, K. Shabirin i O. T. Doumbouya (2022) iznose rezultate svog istraživanja u kojem su otkrili da postoji izvesna razlika u pokazateljima *Altman-ovog Z-score-a* pre i tokom pandemije virusa COVID-19.

METODOLOGIJA ISTRAŽIVANJA

Kao kriterijumi za razvrstavanje preduzeća po veličini, korišćeni su kriterijumi dati u Zakonu o računovodstvu Republike Srbije, a predstavljeni su u Tabeli 1, pri čemu treba imati u vidu da je potrebno da budu ispunjena dva od tri navedena uslova kako bi se preduzeće svrstalo u određenu grupu.

Dakle, u pitanju su akcionarska društva koja su kotirana na Beogradskoj berzi, to jest, čijim se akcijama može trgovati na berzi. Vremenski period koji je istraživanjem obuhvaćen je period od 2018. do 2022. godine, odnosno period od pet godina, pri čemu se sve performanse kompanija posmatraju na kraju godine, imajući u vidu činjenicu da su predmet analize finansijski izveštaji kompanija koji se objavljuju na kraju poslovne godine. Svi finansijski

izveštaji preuzeti su sa sajta Agencije za privredne registre (APR), a podaci prikazani u njima obrađeni su u statističkom programu za društvene nauke (SPSS). Za kompanije koje ih sastavljaju, korišćeni su konsolidovani finansijski izveštaji, budući da je adekvatnije sagledati finansijske izveštaje čitave grupe, nego samo matične kompanije, čime konsolidovani finansijski izveštaji pružaju bolju osnovu za analizu.

U radu su korišćene kvalitativne metode analize, sinteze, indukcije, dedukcije, kao i apstrakcija. U smislu kvantifikovanja verovatnoće nastupanja finansijskih neprilika u kompanijama, korišćen je najpoznatiji i, moglo bi se reći, najpriznatiji model, poznat kao *Altman-ov Z-score*. Ovaj model se zasniva na izračunavanju određenih racio pokazatelja (od X_1 do X_5), na osnovu kojih se izračunavaju *Z-pokazatelji* koji sublimiraju efekat svih pet pomenutih varijabli (izuzev pokazatelja *Z'* koji sublimira efekat četiri varijable), pa se na osnovu rezultata *Z-pokazatelja* donosi zaključak o verovatnoći nastupanja stečaja u kompanijama. Sam model se predstavlja formulom (Altman, 1968):

$$Z = 1,2 X_1 + 1,4 X_2 + 3,3 X_3 + 0,6 X_4 + 0,999 X_5 \quad (1)$$

gde je *Z* *Altman-ov Z-score*, a ostali elementi obeleženi sa *X* se izračunavaju na sledeći način:

X_1 = Neto obrtna sredstva / Ukupna imovina

X_2 = Neraspoređeni dobitak / Ukupna imovina

X_3 = Dobitak pre kamate i poreza (EBIT - Earnings Before Interest and Taxes) / Ukupna imovina

Tabela 1 Kriterijumi za razvrstavanje preduzeća po veličini

Veličina	Prosečan broj zaposlenih	Poslovni prihodi	Ukupna aktiva
Mikro preduzeće	≤ 10 zaposlenih	≤ 700.000 evra	≤ 350.000 evra
Malo preduzeće	> 10 i ≤ 50 zaposlenih	> 700.000 i ≤ 8.000.000 evra	> 350.000 i ≤ 4.000.000 evra
Srednje preduzeće	> 50 i ≤ 250 zaposlenih	> 8.000.000 i ≤ 40.000.000 evra	> 4.000.000 i ≤ 20.000.000 evra
Veliko preduzeće	> 250 zaposlenih	> 40.000.000 evra	> 20.000.000 evra

Izvor: Autori na osnovu Zakona o računovodstvu Republike Srbije

X_4 = Tržišna vrednost sopstvenog kapitala / Knjigovodstvena vrednost ukupnih obaveza (u daljem tekstu ovako izračunata varijabla će se obeležavati sa „X4.1“)

X_5 = Prihodi od prodaje / Ukupna imovina

Za kompanija čija je vrednost *Z-score*-a niža od 1,80, postoji velika verovatnoća nastupanja stečaja. Ukoliko je vrednost *Z-score*-a veća od 3,00, verovatnoća stečaja je veoma mala. Raspon između 1,80 i 3,00 predstavlja takozvanu „zonu neznanja“ ili „sivu zonu“ u kojoj je teško odrediti verovatnoću stečaja.

Budući da je *Z-score* bio primenljiv samo na javne kompanije, a ne i na privatne (zbog pokazatelja X_4), *Altman* je razvio novi model sa novim ponderima, koji se mogu primeniti i na kompanijama čijim se akcijama ne trguje (*Altman, Iwanicz-Drozowska, Laitinen & Suvas, 2017*):

$$Z' = 0,717 X_1 + 0,847 X_2 + 3,107 X_3 + 0,420 X_4 + 0,998 X_5 \quad (2)$$

gde X_4 predstavlja odnos knjigovodstvene vrednosti sopstvenog kapitala i knjigovodstvene vrednosti ukupnih obaveza (u daljem tekstu ovako izračunata varijabla će se obeležavati sa „X4.2“).

Ukoliko je vrednost Z' niža od 1,23, postoji velika verovatnoća stečaja, dok u situaciji kada je vrednost Z' veća od 2,90 postoji veoma mala verovatnoća nastupanja stečaja. Kada je vrednost Z' -score-a između 1,23 i 2,90, ne može se sa sigurnošću odrediti verovatnoća stečaja („siva zona“).

Kako ne bi postojao uticaj delatnosti na model predviđanja stečaja, razvijen je i model sa četiri varijable, u kome je isključena varijabla X_5 (*Altman & Hotchkiss, 1993*):

$$Z'' = 3,25 + 6,56 X_1 + 3,26 X_2 + 6,72 X_3 + 1,05 X_4 \quad (3)$$

gde se varijabla X_4 određuje kao kod Z' modela (u daljem tekstu ovako izračunata varijabla će se obeležavati sa „X4.2“), a kod kompanija koje imaju negativnu vrednost Z'' , verovatnoća nastupanja finansijskih neprilika je veoma velika.

Za potrebe sagledavanja profitabilnosti izračunati su pokazatelji ROA i ROE, dok su za potrebe sagledavanja

likvidnosti izračunati pokazatelji opšte, rigorozne i gotovinske likvidnosti, a kao pokazatelj solventnosti uzet je pokazatelj X_4 *Altman*-ovog *Z-score*-a. S druge strane, leveridž je računat kao odnos ukupnih obaveza i ukupne pasive (aktive), dok je rast kompanije meren kao lančani indeks promene poslovnog dobitka u tekućoj u odnosu na prethodnu godinu.

Svi analizirani podaci su obrađeni statistički, u programu *SPSS*. Pritom, najpre je korišćena deskriptivna statistička analiza, dok je za sagledavanje međuzavisnosti pojedinih determinanti i verovatnoće nastupanja finansijskih neprilika (*Altman*-ovog *Z-score*-a) korišćena korelaciona statistička analiza. Za potrebe analize razlika u vrednostima *Altman*-ovog *Z-score*-a pre i nakon pojave pandemije izazvane virusom COVID-19 korišćen je *Wilcoxon*-ov test rangova sa znakom, a pre toga je za testiranje normalnosti rasporeda korišćen *Shapiro-Wilk* test.

REZULTATI EMPIRIJSKOG ISTRAŽIVANJA

Najpre su predstavljeni rezultati deskriptivne statistike u Tabeli 2, gde su prikazani rezultati aritmetičke sredine, najmanjih vrednosti (minimum), najvećih vrednosti pokazatelja (maksimum), standardne devijacije i medijane za pojedinačne pokazatelje, ali i sublimirane pokazatelje *Altman*-ovog *Z-score*-a, kao i za pojedine faktore koji utiču na vrednosti *Altman*-ovog *Z-score*-a, a koji su hipotezama utvrđeni.

Podaci neophodni za sprovođenje istraživanja i izračunavanje pokazatelja prikupljeni su iz finansijskih izveštaja analiziranih kompanija, sa sajta Agencije za privredne registre (APR), a obrađeni putem statističkog programa za društvene nauke *SPSS*. Za određivanje statističke značajnosti korišćeni su nivoi poverenja $\alpha = 0,05$ i $\alpha = 0,01$.

U Tabeli 2 su dati rezultati deskriptivne statistike pojedinih determinanti i *Altman*-ovog *Z-score*-a budući da je *Z-score* za odabrani uzorak (kotirana akcionarska društva) najpogodnije merilo nastupanja finansijskih neprilika.

Tabela 2 Deskriptivna statistika korišćenih racio pokazatelja i Z-score-a

Godina		ROA	ROE	ROL	RRL	RGL	Solventn.	Leveridž	Rast	Z-score
2018	Aritm. sredina	0,023	0,072	1,925	1,264	0,330	1,963	0,503	-0,058	2,754
	Medijana	0,016	0,034	1,317	0,893	0,066	0,582	0,459	-0,150	2,096
	Stand. devijac.	0,072	0,135	1,724	1,320	0,633	4,520	0,345	3,137	3,086
	Minimum	-0,328	-0,288	0,066	0,041	0,000	0,010	0,041	-15,014	-1,400
	Maksimum	0,223	0,716	9,371	6,825	3,164	33,935	1,704	14,273	22,068
2019	Aritm. sredina	0,027	0,105	1,980	1,288	0,403	2,149	0,478	1,193	2,881
	Medijana	0,017	0,025	1,405	0,859	0,108	0,596	0,426	0,180	2,190
	Stand. devijac.	0,173	0,436	1,948	1,396	0,785	4,931	0,316	4,124	3,250
	Minimum	-1,032	-0,241	0,058	-1,011	0,000	0,006	0,042	-4,685	-1,648
	Maksimum	0,897	3,690	12,326	6,093	3,975	36,754	1,500	22,551	23,565
2020	Aritm. sredina	0,006	-0,165	2,027	1,343	0,459	2,074	0,482	-3,995	2,679
	Medijana	0,013	0,027	1,587	0,962	0,136	0,580	0,411	0,040	2,097
	Stand. devijac.	0,103	1,430	1,650	1,311	0,708	4,787	0,341	35,373	3,143
	Minimum	-0,384	-11,784	0,052	0,033	0,000	0,004	0,055	-296,146	-2,077
	Maksimum	0,281	0,440	7,884	6,237	2,874	35,622	1,701	31,432	22,793
2021	Aritm. sredina	0,007	-0,018	1,876	1,237	0,413	1,908	0,495	0,899	2,596
	Medijana	0,014	0,030	1,521	0,895	0,127	0,599	0,426	-0,009	2,174
	Stand. devijac.	0,092	0,438	1,450	1,224	0,776	4,384	0,361	7,305	2,865
	Minimum	-0,471	-3,570	0,049	0,032	0,001	0,011	0,055	-14,860	-1,939
	Maksimum	0,190	0,319	7,139	6,489	5,528	32,681	1,697	38,541	20,710
2022	Aritm. sredina	0,014	0,003	1,891	1,211	0,359	2,511	0,523	-0,113	3,077
	Medijana	0,014	0,025	1,443	0,888	0,097	0,665	0,443	-0,009	2,081
	Stand. devijac.	0,082	0,220	1,471	1,187	0,640	7,142	0,512	1,546	4,350
	Minimum	-0,254	-1,449	0,035	0,025	0,000	0,015	0,048	-5,698	-2,117
	Maksimum	0,316	0,351	7,376	5,755	3,937	55,367	3,663	4,121	33,587

Izvor: Autori

Prema podacima prikazanim u Tabeli 2, može se jasno zaključiti da se u svim posmatranim godinama kod kompanija iz posmatranog uzorka rezultat dobijenog *Altman*-ovog *Z-score*-a (koji se koristi za kotirane kompanije) nalazi u takozvanoj „sivoj zoni“, budući da su vrednosti i aritmetičke sredine i medijane *Altman*-ovog *Z-score*-a u svim posmatranim godinama između donjeg i gornjeg praga, odnosno između 1,80 i 3,00. Međutim, u 2022. godini, aritmetička sredina iznosi 3,077, što znači da su posmatrane kompanije pretežno imale malu verovatnoću nastupanja finansijskih neprilika, što govori u prilog hipotezi H6, budući da je u pitanju godina u kojoj je pandemija imala slab efekat. Minimalne vrednosti *Altman*-ovog *Z-score*-a odnose se na kompaniju *Politika AD*, što znači da je ova kompanija izuzetno izložena finansijskim neprilikama i postoji velika verovatnoća otvaranja stečajnog postupka.

U cilju testiranja hipoteze H1, potrebno je analizirati rezultate korelacione analize koji su predstavljeni u Tabeli 3. Pritom, korišćen je *Spearman*-ov koeficijent korelacije, budući da je putem *box-plot* dijagrama utvrđeno da nije reč o rasporedu koji je normalan. U takvoj situaciji *Spearman*-ov koeficijent korelacije je pogodnije merilo za utvrđivanje međuzavisnosti varijabli. Treba imati u vidu da se vrednosti *Altman*-ovog *Z-score*-a tumače inverzno, odnosno da veće vrednosti *Z*-pokazatelja označavaju manju verovatnoću nastupanja finansijskih neprilika, dok manje vrednosti *Z*-pokazatelja označavaju veću verovatnoću nastupanja finansijskih neprilika, pa će i tumačenje rezultata analize biti učinjeno shodno toj činjenici.

Uzimajući u obzir rezultate prikazane u Tabeli 3, može se reći da do 2020. godine postoji statistički

Tabela 3 Rezultati *Spearman*-ove korelacije pokazatelja profitabilnosti i pokazatelja *Altman*-ovog *Z-score*-a

God.	Pokaz.		Z	Z'	Z''	God.	Pokaz.		Z	Z'	Z''	
2018	ROA	<i>Spearman</i> -ov koef. kor.	0,602**	0,567**	0,544**	2019	ROA	<i>Spearman</i> -ov koef. kor.	0,619**	0,542**	0,558**	
		Sig. (2-tailed)	0,000	0,000	0,000			Sig. (2-tailed)	0,000	0,000	0,000	
		n	73	73	73			n	73	73	73	
	ROE	<i>Spearman</i> -ov koef. kor.	0,506**	0,458**	0,327**		ROE	<i>Spearman</i> -ov koef. kor.	0,578**	0,473**	0,433**	
		Sig. (2-tailed)	0,000	0,000	0,000			Sig. (2-tailed)	0,000	0,000	0,000	
		n	73	73	73			n	73	73	73	
2020	ROA	<i>Spearman</i> -ov koef. kor.	0,482**	0,457**	0,404**	2021	ROA	<i>Spearman</i> -ov koef. kor.	0,557**	0,452**	0,334**	
		Sig. (2-tailed)	0,000	0,000	0,000			Sig. (2-tailed)	0,000	0,000	0,004	
		n	73	73	73			n	73	73	73	
	ROE	<i>Spearman</i> -ov koef. kor.	0,451**	0,383**	0,279*		ROE	<i>Spearman</i> -ov koef. kor.	0,493**	0,342**	0,232*	
		Sig. (2-tailed)	0,000	0,001	0,017			Sig. (2-tailed)	0,000	0,003	0,048	
		n	73	73	73			n	73	73	73	
2022	ROA	<i>Spearman</i> -ov koef. kor.	0,379**	0,412**	0,267**							
		Sig. (2-tailed)	0,001	0,000	0,022							
		n	73	73	73							
	ROE	<i>Spearman</i> -ov koef. kor.	0,316**	0,321**	0,179							
		Sig. (2-tailed)	0,006	0,006	0,129							
		n	73	73	73							

** Korelacija je statistički značajna na nivou od Sig.=0,01 (2-tailed) * Korelacija je statistički značajna na nivou od Sig.=0,05 (2-tailed)

Izvor: Autori

značajna jaka pozitivna korelacija (*Spearman*-ov koeficijent korelacije iznosi preko 0,6 i Sig.=0,000 < α = 0,01) racio pokazatelja ROA i *Altman*-ovog *Z-score*-a, koji je relevantniji u odnosu na Z' i Z''. Zatim, u 2020. i 2021. godini postoji statistički značajna umerena pozitivna korelacija (*Spearman*-ov koeficijent korelacije iznosi između 0,4 i 0,6, a Sig.=0,000 < α = 0,01) racio pokazatelja profitabilnosti (ROA i ROE) i *Altman*-ovog *Z-score*-a. Najzad, u 2022. godini prisutna je statistički značajna slaba pozitivna korelacija (*Spearman*-ov koeficijent korelacije iznosi 0 i 0,4, a Sig.=0,000 < α = 0,01).

Hipoteza H2 će biti testirana, kao i hipoteza H1, primenom korelacione analize. Rezultati korelacione analize između pokazatelja likvidnosti (ROL, RRL i RGL) predstavljeni su u Tabeli 4. Pritom, broj jedinica posmatranja ostaje nepromenjen (n=73).

Na osnovu podataka prikazanih u Tabeli 4, jasno je da postoji statistički značajna jaka pozitivna korelacija, odnosno međuzavisnost likvidnosti i *Altman*-ovog *Z-score*-a u javnim akcionarskim društvima koja čine uzorak, odnosno da postoji statistički značajna jaka negativna korelacija likvidnosti i

verovatnoće nastupanja stečaja. Treba imati u vidu da pozitivna korelacija likvidnosti i *Altman*-ovog *Z-score*-a označava negativnu korelaciju likvidnosti i verovatnoće nastupanja finansijskih neprilika zbog inverznog tumačenja vrednosti *Altman*-ovog *Z-score*-a (manje vrednosti označavaju veću verovatnoću finansijskih neprilika i obrnuto). Jedino u 2021. godini postoji umerena korelacija, međutim, vrednost samog koeficijenta je izuzetno blizu praga od 0,6, što takođe ukazuje na skoro jaku korelaciju likvidnosti i pokazatelja *Altman*-ovog *Z-score*-a. Sve dobijene vrednosti su statistički značajne na nivou od 99% (Sig.=0,000 ili 0,001 < α = 0,01). S druge strane, ukoliko se posmatra korelacija likvidnosti i Z' i Z'' pokazatelja, mogu se uočiti i vrednosti *Spearman*-ovog koeficijenta korelacije koje ukazuju na izuzetno jaku pozitivnu korelaciju (koeficijent korelacije > 0,8) koja je statistički značajna uz nivo pouzdanosti od 99% (Sig.=0,000 ili 0,001 < α = 0,01).

Za testiranje hipoteze H3 koja se odnosi na međuzavisnost solventnosti i mogućnosti nastupanja finansijskih teškoća u kompanijama, korišćena je, takođe, korelaciona statistička analiza

Tabela 4 Rezultati *Spearman*-ove korelacije pokazatelja likvidnosti i pokazatelja *Altman*-ovog *Z-score*-a

God.	Pokaz.	Z	Z'	Z''	God.	Pokaz.	Z	Z'	Z''
2018	ROL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,695** 0,000	0,670** 0,000	0,909** 0,000	2019	ROL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,669** 0,000	0,609** 0,000	0,808** 0,000
	RRL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,742** 0,000	0,734** 0,000	0,833** 0,000		RRL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,710** 0,000	0,700** 0,000	0,758** 0,000
	RGL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,629** 0,000	0,689** 0,000	0,724** 0,000		RGL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,594** 0,000	0,626** 0,000	0,598** 0,000
2020	ROL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,663** 0,000	0,688** 0,000	0,875** 0,000	2021	ROL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,537** 0,000	0,725** 0,000	0,831** 0,000
	RRL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,659** 0,000	0,706** 0,001	0,816** 0,000		RRL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,643** 0,000	0,768** 0,000	0,786** 0,000
	RGL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,683** 0,000	0,779** 0,000	0,770** 0,000		RGL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,574** 0,000	0,653** 0,000	0,611** 0,000
2022	ROL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,640** 0,001	0,700** 0,000	0,933** 0,000					
	RRL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,635** 0,000	0,712** 0,000	0,865** 0,000					
	RGL <i>Spearman</i> -ov koef. kor. Sig. (2-tailed)	0,671** 0,000	0,744** 0,000	0,713** 0,000					

** Korelacija je statistički značajna na nivou od Sig.=0,01 (2-tailed)

Izvor: Autori

u statističkom programu *SPSS*. Pritom, kao i kod testiranja prethodnih hipoteza, uzorak ostaje nepromenjen, odnosno $n=73$. Treba imati u vidu da pozitivna korelacija solventnosti i *Altman*-ovog *Z-score*-a označava negativnu korelaciju solventnosti i verovatnoće nastupanja finansijskih neprilika zbog inverznog tumačenja vrednosti *Altman*-ovog *Z-score*-a (manje vrednosti označavaju veću verovatnoću finansijskih neprilika i obrnuto).

U Tabeli 5 su kao pokazatelji solventnosti korišćeni pokazatelji X_4 *Altman*-ovog modela, zbog toga što je formula za izračunavanje X_4 identična formuli za izračunavanje ratio pokazatelja solventnosti. Pritom, X4.1 se koristi prilikom izračunavanja *Z-score*-a (za kotirana akcionarska društva), dok je X4.2 prilagođen za izračunavanje pokazatelja Z' i Z'' (za kompanije koje nisu kotirane). Uz rizik greške (p-vrednost) od 1% (Sig.=0,000 < α = 0,01) i nivo pouzdanosti od 99%, može se tvrditi da između pokazatelja X4.1 i pokazatelja Z postoji umerena pozitivna korelacija koja teži ka nivou jake korelacije (u svakoj posmatranoj godini je vrednost bliža 0,6, nego 0,4), dok između pokazatelja X4.2 i pokazatelja Z' i Z'' postoji jaka pozitivna

korelacija (Sig. < α = 0,01). Ukoliko se posmatranje izvrši na suprotan način, jasno se vidi da je pokazatelj X4.1 uglavnom slabo korelisan sa pokazateljima Z' i Z'' (naročito sa Z'), kao i da je pokazatelj X4.2 umereno, a po svojoj vrednosti, gotovo slabo korelisan sa pokazateljem Z, što dodatno opravdava tvrdnju da je X4.1 pogodan za izračunavanje Z pokazatelja, a X4.2 za izračunavanje pokazatelja Z' i Z'' .

U cilju testiranja hipoteze H4, rezultati korelacione analize leveridža i pokazatelja *Altman*-ovog *Z-score*-a prikazani su u Tabeli 6. Hipoteza je testirana na svih 73 javnih akcionarskih društava, koja i čine uzorak. Pritom, kao i do sada, treba imati u vidu da pozitivna korelacija ove determinante sa Z-pokazateljima označava negativnu međuzavisnost sa verovatnoćom nastupanja finansijskih neprilika, odnosno da negativna korelacija sa Z-pokazateljima podrazumeva pozitivnu korelaciju sa verovatnoćom nastupanja stečaja i finansijskih neprilika u posmatranim kompanijama.

Na osnovu podataka prikazanih u Tabeli 6, može se sa nivoom pouzdanosti od 99% (Sig. < α = 0,01) tvrditi

Tabela 5 Rezultati *Spearman*-ove korelacije pokazatelja solventnosti i pokazatelja *Altman*-ovog *Z-score*-a

God.	Pokaz.	Z	Z'	Z''	God.	Pokaz.	Z	Z'	Z''
2018	X4.1 Spearman-ov koef. kor.	0,546**	0,314**	0,659**	2019	X4.1 Spearman-ov koef. kor.	0,565**	0,401**	0,645**
	Sig. (2-tailed)	0,000	0,007	0,000		Sig. (2-tailed)	0,000	0,000	0,000
	X4.2 Spearman-ov koef. kor.	0,422**	0,593**	0,878**		X4.2 Spearman-ov koef. kor.	0,432**	0,601**	0,844**
	Sig. (2-tailed)	0,000	0,000	0,000		Sig. (2-tailed)	0,000	0,000	0,000
2020	X4.1 Spearman-ov koef. kor.	0,564**	0,389**	0,632**	2021	X4.1 Spearman-ov koef. kor.	0,546**	0,406**	0,647**
	Sig. (2-tailed)	0,000	0,001	0,000		Sig. (2-tailed)	0,000	0,000	0,000
	X4.2 Spearman-ov koef. kor.	0,438**	0,683**	0,895**		X4.2 Spearman-ov koef. kor.	0,404**	0,664**	0,910**
	Sig. (2-tailed)	0,000	0,000	0,000		Sig. (2-tailed)	0,000	0,000	0,000
2022	X4.1 Spearman-ov koef. kor.	0,586**	0,399**	0,636**					
	Sig. (2-tailed)	0,000	0,000	0,022					
	X4.2 Spearman-ov koef. kor.	0,452**	0,611**	0,896**					
	Sig. (2-tailed)	0,000	0,000	0,000					

** Korelacija je statistički značajna na nivou od Sig.=0,01 (2-tailed)

Izvor: Autori

Tabela 6 Rezultati *Spearman*-ove korelacije između leveridža (Lev.) i pokazatelja *Altman*-ovog *Z-score*-a

God.	Pokaz.	Z	Z'	Z''
2018	Lev. Spearman-ov koef. kor.	-0,416**	-0,590**	-0,873**
	Sig. (2-tailed)	0,000	0,007	0,000
2019	Lev. Spearman-ov koef. kor.	-0,422**	-0,595**	-0,838**
	Sig. (2-tailed)	0,000	0,000	0,000
2020	Lev. Spearman-ov koef. kor.	-0,427**	-0,678**	-0,889**
	Sig. (2-tailed)	0,000	0,001	0,000
2021	Lev. Spearman-ov koef. kor.	-0,395**	-0,662**	-0,903**
	Sig. (2-tailed)	0,001	0,000	0,000
2022	Lev. Spearman-ov koef. kor.	-0,427**	-0,590**	-0,884**
	Sig. (2-tailed)	0,000	0,000	0,022

** Korelacija je statistički značajna na nivou od Sig.=0,01 (2-tailed)

Izvor: Autori

da postoji statistički značajna negativna (inverzna) korelacija leveridža, koji označava stepen zaduženosti, i pokazatelja *Altman*-ovog *Z-score*-a, odnosno da postoji pozitivna korelacija leveridža i verovatnoće nastupanja finansijskih neprilika. Uglavnom je ta međuzavisnost umerenog karaktera (umerena negativna korelacija), tokom čitavog posmatranog perioda. Međutim, ono što je zanimljivo jeste da je korelacija sa *Z'-score*-om u domenu umerene, pa čak i jake negativne (jaka negativna korelacija postoji u 2020. i 2021. godini), dok je negativna korelacija leveridža i *Z''*-pokazatelja u svakoj od posmatranih godina izuzetno jaka (koeficijent korelacije <

-0,8). Drugim rečima, što je model za predviđanje nastupanja finansijskih neprilika u kompanijama pojednostavljeniji, to je negativna korelacija leveridža i *Altman*-ovog *Z-score*-a jača. U svakom slučaju, jasno je da postoji statistički značajna negativna korelacija leveridža i pokazatelja *Altman*-ovog *Z-score*-a, što dalje znači da postoji pozitivna korelacija leveridža i verovatnoće nastupanja finansijskih neprilika.

Radi testiranja hipoteze H5, u Tabeli 7 su dati rezultati korelacione analize indeksa rasta i pokazatelja *Altman*-ovog *Z-score*-a. Ova hipoteza je zahtevala određene korekcije u smislu izuzimanja nekih jedinica posmatranja iz uzorka, pa nisu testirane

sve kompanije koje su inicijalno činile uzorak, jer je uočeno postojanje *outlier-a*, odnosno jedinica posmatranja kod kojih postoje izražene ekstremne vrednosti.

Uzimajući u obzir prikazane rezultate korelacione analize u Tabeli 7, može se uočiti da u većini godina posmatranog perioda postoji slaba korelacija pokazatelja rasta i pokazatelja *Altman-ovog Z-score-a*. Naime, u 2018., 2019. i 2022. godini sa nivoom pouzdanosti od 95% (Sig. $< \alpha = 0,05$) može se tvrditi da postoji statistički značajna slaba pozitivna korelacija (koeficijent korelacije $> 0; < 0,4$) rasta i *Altman-ovog Z-score-a* posmatranih kompanija. S druge strane, sa nivoom pouzdanosti od 99% (Sig. $< \alpha = 0,01$) može se tvrditi da u 2020. i 2021. godini postoji statistički značajna umerena pozitivna korelacija indeksa rasta i pokazatelja *Altman-ovog Z-score-a*. Ovo dalje znači da postoji statistički značajna negativna međuzavisnost rasta kompanije i verovatnoće nastupanja finansijskih nepravilnosti. Ono što se u Tabeli takođe može jasno uočiti jeste činjenica da je za potrebe testiranja H5 broj jedinica posmatranja (n) smanjen, budući da je uočeno postojanje ekstremnih vrednosti (*outlier-a*) koje mogu da u izvesnom smislu ometaju istraživanje,

te da dobijeni rezultati budu nepouzdati. Zbog toga, kompanije koje su imale ekstremne vrednosti (pozitivne ili negativne) indeksa rasta isključene su iz istraživanja.

U Tabelama 8 i 9 dati su rezultati testiranja poslednje hipoteze H6. Ova hipoteza odnosi se na razlike u vrednosti pokazatelja *Altman-ovog Z-score-a* pre i nakon pojave pandemije izazvane virusom COVID-19, pri čemu je posmatrana jedna godina pre pojave pandemije (2019. godina) i jedna godina nakon pojave pandemije (2020. godina), te su rezultati na taj način i prikazani. Pritom, iz uzorka su eliminisane tri kompanije koje su predstavljale ekstremne vrednosti. Za potrebe testiranja ove hipoteze korišćene su samo vrednosti *Z-score-a* (ne i vrednosti Z' i Z''), budući da je reč o najpouzdanijem merilu, jer su sve kompanije kotirane na Beogradskoj berzi. S obzirom na to da su predmet posmatranja iste kompanije u 2019. i 2020. godini i da se posmatra promena vrednosti jedne varijable (*Z-score*) pre i nakon pojave pandemije virusa COVID-19, reč je o zavisnim uzorcima sa ponovljenim merenjem. Kako bi se odredilo da li će biti primenjen *t-test* uparenih uzoraka (parametarski) ili *Wilcoxon-ov test* rangova sa znakom (neparametarski) potrebno

Tabela 7 Rezultati *Spearman-ove* korelacije indeksa rasta i pokazatelja *Altman-ovog Z-score-a*

God.	Pokaz.	Z	Z'	Z''
2018	<i>Spearman-ov</i> koef. kor.	0,311*	0,181	0,117
	Sig. (2-tailed)	0,020	0,181	0,391
	n	56	56	56
2019	<i>Spearman-ov</i> koef. kor.	0,335*	0,295*	0,406**
	Sig. (2-tailed)	0,015	0,034	0,003
	n	52	52	52
2020	<i>Spearman-ov</i> koef. kor.	0,384**	0,246	-0,011
	Sig. (2-tailed)	0,004	0,067	0,937
	n	56	56	56
2021	<i>Spearman-ov</i> koef. kor.	0,410**	0,182	0,165
	Sig. (2-tailed)	0,001	0,167	0,213
	n	59	59	59
2022	<i>Spearman-ov</i> koef. kor.	0,251*	-0,165	-0,206
	Sig. (2-tailed)	0,044	0,190	0,100
	n	65	65	65

** Korelacija je statistički značajna na nivou od Sig.=0,01 (2-tailed) * Korelacija je statistički značajna na nivou od Sig.=0,05 (2-tailed)

Izvor: Autori

Tabela 8 Rezultati *Shapiro-Wilk* testa

	Shapiro-Wilk		
	Statistic	n	Sig.
Z(2019) - Z(2020)	0,939	70	0,002

Izvor: Autori

Tabela 9 Rezultati *Wilcoxon*-ovog testa rangova sa znakom

	Asymp. Sig. (2-tailed)	n	Medijana
Z (2019)	/	70	2,200
Z (2020)	/	70	2,053
Z (2019) - Z (2020)	0,019	/	/

Izvor: Autori

je testirati normalnost razlika vrednosti varijable pre i nakon pojave pandemije, što je učinjeno putem *Shapiro-Wilk* testa, čiji su rezultati predstavljeni u Tabeli 8. Na isti način su u svom radu I. Rahmah i I. Novianty (2021) testirali hipotezu o razlikama u vrednosti pokazatelja *Altman*-ovog *Z-score*-a pre i nakon pojave pandemije izazvane virusom COVID-19 (u 2019. i 2020. godini).

Rezultati *Shapiro-Wilk* testa normalnosti rasporeda razlika posmatranih varijabli uz nivo pouzdanosti od 99% (Sig.=0,002 < α =0,01), ukazuju na to da razlika posmatranih varijabli ne sledi normalan raspored. Samim tim, dalji tok istraživanja je usmeren na sprovođenje *Wilcoxon*-ovog testa rangova sa znakom. Zahvaljujući *box-plot* dijagramu, uočeno je prisustvo tri prava *outlier*-a (ekstremne vrednosti), pa je samim tim odluka istraživača, zbog izuzetno visokih vrednosti, da ih eliminiše iz uzorka, zadržavajući njegovu reprezentativnost.

Sprovođenjem *Wilcoxon*-ovog testa rangova sa znakom uz nivo pouzdanosti od 95% (Sig.=0,019 < α =0,05) može se zaključiti da postoji statistički značajna razlika medijalnih vrednosti *Altman*-ovog *Z-score*-a pre i nakon pojave pandemije virusa COVID-19 u skupu posmatranih kotiranih akcionarskih društava

(srednjih i velikih) na Beogradskoj berzi. U tom kontekstu treba naglasiti da se medijalna vrednost *Altman*-ovog *Z-score*-a smanjila u 2020. u odnosu na 2019. godinu (sa 2,200 na 2,053), što znači da je došlo do povećanja verovatnoće nastupanja finansijskih neprilika u posmatranim kompanijama.

ZAKLJUČAK

Istraživanje koje je sprovedeno u ovom radu obuhvatilo je 51 srednje i 22 velika javna akcionarska društva koja su kotirana na Beogradskoj berzi u okviru *Prime Listing*-a ili *Open Market*-a u periodu od 2018. do 2022. godine, a na osnovu finansijskih izveštaja koji su javno dostupni na sajtu Agencije za privredne registre (APR) čiji su podaci obrađeni u statističkom programu za društvene nauke *SPSS*-u. Cilj istraživanja, kao što je na početku rada navedeno, bio je uočavanje veza određenih faktora, koji predstavljaju determinante nastupanja finansijskih neprilika u kompanijama i pokazatelja *Altman*-ovog *Z-score*-a koji predviđa verovatnoću nastupanja finansijskih neprilika kompanija.

Na osnovu svih prikazanih rezultata, mogu se izneti zaključci o formulisanim hipotezama. Prva hipoteza je potvrđena, budući da su rezultati istraživanja pokazali statistički značajnu pozitivnu korelaciju profitabilnosti i vrednosti *Altman*-ovog *Z-score*-a, što znači da između profitabilnosti i verovatnoće nastupanja finansijskih neprilika postoji statistički značajna negativna korelacija, budući da niži nivoi *Z*-pokazatelja znače veću verovatnoću nastupanja finansijskih neprilika i obrnuto. Dakle, nalazi istraživanja su saglasni sa rezultatima ranijih istraživanja (Campbell *et al.*, 2005; Thim *et al.*, 2011; Masdupi *et al.*, 2018; Dwiantari & Artini, 2021), odnosno istraživanje u ovom radu o međuzavisnosti profitabilnosti i verovatnoće nastupanja finansijskih neprilika je potvrdilo dosadašnja relevantna istraživanja.

Druga hipoteza se potvrđuje, jer je tokom celog posmatranog perioda (5 godina) postojala statistički značajna jaka pozitivna korelacija pokazatelja

likvidnosti i *Z-score-a*, što upućuje na zaključak da postoji statistički značajna negativna korelacija likvidnosti i verovatnoće nastupanja finansijskih neprilika, imajući u vidu činjenicu da veće vrednosti *Z-score-a* označavaju manju verovatnoću nastupanja finansijskih neprilika i obrnuto. Stoga se može konstatovati da su rezultati istraživanja u radu saglasni sa zaključcima prethodnih istraživanja (Mikkelsen & Partch, 2003; Butler *et al*, 2005; Desiyanti *et al*, 2019; Thim *et al*, 2011; Kim-Soon *et al*, 2013).

Treća hipoteza je potvrđena, budući da postoji pozitivna korelacija pokazatelja solventnosti i *Altman-ovog Z-score-a*, što upućuje na zaključak da postoji negativna korelacija solventnosti i verovatnoće nastupanja finansijskih neprilika (niži *Z* pokazatelj označava veću verovatnoću nastupanja finansijskih neprilika i obrnuto). Dakle, rezultati predstavljeni u istraživanju sprovedenom u radu se podudaraju sa rezultatima prethodnih istraživanja (Harris & Raviv, 1990; Thim *et al*, 2011; Amoa-Gyarteng, 2021; Megasanti & Riwayati, 2023).

Četvrta istraživačka hipoteza je potvrđena, imajući u vidu prikazane rezultate istraživanja. Ovakvi nalazi koji se odnose na korelaciju leveridža i verovatnoće nastupanja finansijskih neprilika su u saglasnosti sa rezultatima prethodnih istraživanja (Harris & Raviv, 1990; Thim *et al*, 2011; Amoa-Gyarteng, 2021; Megasanti & Riwayati, 2023). Ovo iz razloga što u slučajevima povećanja zaduženosti kompanije može doći do privremenog smanjenja verovatnoće nastupanja finansijskih neprilika zbog novog priliva sredstava u kompaniju. Međutim, treba imati u vidu izvor tih sredstava, odnosno činjenicu da je u pitanju dug, koji treba otplatiti u budućem periodu, uz pripadajuću kamatu. Kompanija može u početnim fazama zaduživanja, nedugo nakon pozajmljivanja sredstava, imati pozitivne performanse, što je i očekivano, budući da kompanija ima priliv velike sume novca u jednom trenutku, a otplaćivanje duga se vrši periodično. Zbog toga, dobijeni rezultati su potpuno opravdani, budući da ukoliko se kompanija zadužuje, dugoročno može imati posledice u smislu nemogućnosti vraćanja duga (uglavnom bankarskih kredita), što vodi kompaniju u stečaj.

Na osnovu prikazanih rezultata, zaključuje se da peta hipoteza nije potvrđena, budući da je, uz različite nivoe pouzdanosti, u posmatranom periodu postojala pozitivna korelacija indeksa rasta i pokazatelja *Altman-ovog Z-score-a*. Ovakvi rezultati su u suprotnosti sa zaključcima iz prethodnih istraživanja (MacKie-Mason, 1990; Yosha, 1995; Morri & Cristanziani, 2009; Thim *et al*, 2011). Razlog ovakvim nalazima je činjenica da kompanije koje imaju evidentan rast poslovnog dobitka, odnosno kompanije koje se razvijaju, imaju i manje šanse da se u budućnosti suoče sa finansijskim neprilikama (pozitivna korelacija rasta poslovnog dobitka i *Altman-ovog Z-score-a*), jer imaju akumulirane dobitke od obavljanja svoje delatnosti. S druge strane, ukoliko se kompanija, odnosno njen poslovni dobitak, smanjuje, u budućnosti može doći do izvesnih finansijskih teškoća, jer kompanija nema akumulirani dobitak od obavljanja redovne delatnosti. Zapravo, taj dobitak se smanjivao iz godine u godinu, te kompanija neće biti u mogućnosti da odgovori na svoje finansijske obaveze blagovremeno, što može dovesti do finansijskih neprilika i stečaja. Kompanije i njihov menadžment uvek treba da promišljaju na način koji je orijentisan ka budućnosti, potrebno je predvideti da se mogu desiti neke iznenadne okolnosti (kao što je bio slučaj sa pandemijom COVID-19) i kreirati adekvatan odgovor na te okolnosti, što je u ovom slučaju akumuliranje dobitka iz redovnog poslovanja, uz procenu optimalnog nivoa te akumulacije, što vodi stabilnijem poslovanju kompanija

Šesta hipoteza je potvrđena, prema prikazanim rezultatima istraživanja, budući da se došlo do zaključka da postoji statistički značajna razlika u pokazateljima *Altman-ovog Z-score-a* pre i nakon pojave pandemije izazvane virusom COVID-19 i može se reći da su rezultati usaglašeni sa prethodnim istraživanjima (Rababah *et al*, 2020; H. O. Aifuwa *et al*, 2020; Rahmah & Novianty, 2021; Marginingsih, 2022; Fitria *et al*, 2022).

Rezultati prikazani u radu imaju određene teorijske i praktične implikacije, odnosno teorijski i praktični doprinos. Teorijski doprinos rada ogleda se u proširivanju teorijskih znanja o značaju sagledavanja budućnosti kompanija kroz prizmu mogućnosti

nastupanja finansijskih teškoća. Naime, teorijski aspekti rada ukazuju na determinante koje mogu imati izuzetan značaj za predviđanje nastupanja finansijskih neprilika, kao i na mogućnosti njihovog kvantifikovanja i dovođenja u vezu sa pokazateljima *Altman*-ovog *Z-score*-a. Teorijske implikacije mogu pomoći u sticanju novih saznanja u oblasti forenzičkog računovodstva i revizije, budući da je *Altman*-ov *Z-score* uveliko prihvaćen u ovim računovodstvenim disciplinama. S druge strane, praktične implikacije rada se ogledaju u doprinosu rada za menadžment kompanija, naročito javnih akcionarskih društava čijim se akcijama trguje na tržištima hartija od vrednosti, imajući u vidu da srednja i velika javna akcionarska društva čine posmatrani uzorak. Računovodstvenim i finansijskim rukovodiocima mogu biti od koristi rezultati ovog rada, kako bi adekvatno i blagovremeno sagledali sve prikazane determinante finansijskih neprilika i doneli ispravne odluke, kako kompanija ne bi došla u situaciju finansijskih neprilika ili čak bankrotstva. Oni mogu da pokušaju da preduprede finansijske neprilike, te da utiču na ove determinante blagovremeno, što će imati pozitivan efekat na poslovanje kompanija. Takođe, rezultati mogu biti korisni i sadašnjim i potencijalnim investitorima i kreditorima kompanija u smislu donošenja odluka o investiranju u određenu kompaniju, putem sagledavanja analiziranih determinanti. Sadašnji investitori će povlačiti svoja sredstva iz kompanija za koje se analizom opisanih determinanti proceni da imaju velike verovatnoće nastupanja finansijskih neprilika, dok će budući investitori izbegavati ulaganje sredstava u takve kompanije. Finansijskim i poslovnim analitičarima nalazi dobijeni u radu mogu biti od izuzetne koristi u smislu determinanti koje bi trebalo uzeti u obzir prilikom analize uspešnosti i adekvatnosti poslovanja određenih kompanija. Budući da se brojni stejkholderi oslanjaju na zaključke donete od strane finansijskih analitičara, potrebno je da te analize budu izuzetno kvalitetne. Zbog toga, rezultati sprovedeni u radu im mogu pomoći u izboru determinanti koje će uzeti u obzir prilikom predviđanja budućnosti kompanije. Takođe, kupci i dobavljači mogu da, analizom verovatnoće nastupanja finansijskih neprilika kod svojih poslovnih partnera, donesu odluke o početku,

nastavku ili prestanku saradnje sa njima. Ukoliko postoji velika verovatnoća nastupanja finansijskih neprilika u jednoj kompaniji, njeni kupci neće želiti da nabavljaju dobra, a dobavljači zbog mogućnosti nastanka nenaplativih potraživanja neće želiti da isporuče tražena dobra toj kompaniji. Budući da u uslovima finansijskih neprilika kompanije mogu da odluče da na nezakonit način izbegnu plaćanje poreza (poreska evazija), rezultati istraživanja su korisni i poreskim vlastima, jer analizom prikazanih varijabli mogu da na vreme identifikuju takve poteze kompanija i spreče ih.

Ipak, istraživanje prikazano u ovom radu ima određenih ograničenja. Naime, analiza je sprovedena na uzorku od 73 javna akcionarska društva, kroz vremenski period od pet godina. Takođe, determinanta rasta je merena kao promena poslovnog dobitka u tekućoj u odnosu na prethodnu godinu. Moguće je da bi rezultati istraživanja bili drugačiji ukoliko bi umesto ovako merenog rasta kompanije, bio korišćen rast posmatran kao promena broja zaposlenih u tekućoj u odnosu na prethodnu godinu, ili promena profita (neto rezultata), ili promena poslovne imovine (ukupne aktive), ili pak kao promena tržišnog učešća u tekućoj u odnosu na prethodnu godinu.

Buduća istraživanja na ovu temu mogu obuhvatiti veći uzorak, pri čemu bi u uzorak bila uključena sva javna akcionarska društva kotirana na Beogradskoj berzi u okviru *Prime Listing*-a i *Open Market*-a (uključujući mikro i mala preduzeća), a može se razmišljati i o uključivanju kompanija iz stranih susednih država u uzorak. Takođe, vremenski period posmatranja bi mogao biti duži, budući da je u radu korišćen vremenski period od pet godina. Kada je reč o determinantama, moguće je uključiti dodatne determinante nastupanja finansijskih neprilika, naročito kada je reč o pokazatelju rasta kompanije, pri čemu bi se ovaj pokazatelj mogao računati na neki od alternativnih načina pomenutih u prethodnom pasusu. S druge strane, dalji koraci u istraživanju ove problematike mogu se ticati primene kompleksnijih statističkih metoda, kao što je, na primer, višestruka regresiona analiza, jer je važno istražiti uticaj svake pojedinačne determinante na pokazatelje verovatnoće

nastupanja finansijskih nepravilnosti, odnosno na pokazatelje Altman-ovog Z-score-a. Tako je moguće otkriti jačinu uticaja pojedinih determinanti i izdvojiti one determinante koje imaju najjači uticaj na nastupanje finansijskih nepravilnosti.

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DETERMINANTS OF THE OCCURRENCE OF FINANCIAL DISTRESS IN MEDIUM-SIZED AND BIG PUBLIC JOINT-STOCK COMPANIES

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Forecasting financial distress in companies is very significant bearing in mind the complexity and dynamics of the modern business environment. Accordingly, the subject matter of this research study is the determinants of the occurrence of the financial distress that may lead a company to bankruptcy. The study is aimed at determining the interdependence (correlation) between certain determinants of the occurrence of financial distress and the indicators of the probability of the occurrence of financial distress and considering the difference in the probability of the occurrence of financial distress before and after the onset of the COVID-19 pandemic in the Republic of Serbia. The research was conducted on a sample of 73 publicly traded companies, of which 22 belong to the group of big companies, and 51 to the group of medium-sized companies over the 2018-2022 period. The results have shown that there is a statistically significant negative correlation between the determinants of profitability, liquidity and solvency and the probability of financial distress. In addition, it was shown that there is a statistically significant positive correlation between leverage and the probability of financial distress, as well as between company growth and the Altman Z-score indicator. It is concluded that there is a statistically significant difference in the value of the Altman Z-score indicator before and after the onset of the pandemic caused by the COVID-19 virus.

Keywords: financial distress, bankruptcy, Altman Z-score, COVID-19

JEL Classification: M41, G32, G33

Pregledni članak

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ULOGA PLANIRANIH ORGANIZACIONIH PROMENA U KORPORATIVNOM PREDUZETNIŠTVU

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U ovom radu se koncept korporativnog preduzetništva dopunjuje doprinosima koje nude modeli planiranih organizacionih promena. Korporativno preduzetništvo, kao rezultat preduzetničkih poduhvata pojedinaca i grupa unutar postojećih organizacija, ima za rezultat inoviranje odnosno regenerisanje postojećih i kreiranje potpuno novih biznisa unutar postojećih kompanija. U literaturi, međutim, malo je istraživani proces promena putem kojih se preduzetnički poduhvati realizuju. Taj jaz ovaj rad nastoji da zatvori. U njemu se, posle predavljanja korporativnog preduzetništva, vrši sinteza doprinosa najviše citiranih modela planiranih organizacionih promena što rezultira u aktivnostima ili koracima koje interni preduzetnik, kao agent promena, treba da preduzme kako bi realizovao projekat korporativnog preduzetništva. Zasnovane na Levinovom (Lewin) modelu (odmrzavanje - pokret - ponovno zamrzavanje), te aktivnosti su: kreiranje svesti o neophodnosti promena, kreiranje i komuniciranje vizije, priprema promena, implementiranje promena, olakšavanje promena, institucionalizacija i monitoring promena. Time se koncept korporativnog preduzetništva dopunjuje i čini realnijim u praksi.

Ključne reči: korporativno preduzetništvo, planirane organizacione promene, interni preduzetnik, proces organizacionih promena

JEL Classification: I26, M10

UVOD

Korporativno preduzetništvo, široko definisano kao preduzetništvo unutar postojećeg biznisa, sve se više posmatra kao alat koji omogućava preduzećima da se podmlade, revitalizuju i da stvore novu vrednost kroz inovacije, razvoj poslovanja i obnovu (Heinonen & Toivonen, 2008). Korporativno preduzetništvo

uključuje kontinuirani kreativni proces, čiji je osnovni cilj implementacija inovacija u organizaciji u funkciji uspešnog poslovanja i rešavanja problema potrošača i društva (Kuratko, Hornsby & Covin, 2014; Crnogaj & Širec, 2014). Mišljenje koje je dao S. A. Zahra and J. G. Covin (1995) sugeriše da je korporativno preduzetništvo formalna ili neformalna aktivnost usmerena na stvaranje novih biznisa u postojećim firmama kroz inovacije proizvoda i procesa i razvoj tržišta. Ovako shvaćeno, korporativno preduzetništvo mora da uključi proces organizacionih promena budući da se jedino kroz organizacione promene

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moгу u postojeću organizaciju uneti inovacije kojima se obnavlja, revitalizuje i razvija biznis model (D'Angelo, Cavallo, Ghezzi & Di Lorenzo, 2024). Iz tog razloga bi planirane organizacione promene mogle da budu veoma koristan koncept u izgradnji modela korporativnog preduzetništva.

Planirane organizacione promene su skup promišljenih aktivnosti koje preduzima menadžment kompanije kako bi pomerio organizaciju iz njenog sadašnjeg stanja u željeno buduće stanje (Stouten, Rousseau & Cremer, 2018). Planirane organizacione promene su veoma složene i uključuju mnoge aktivnosti i učesnike i dešavaju se u uslovima koji se stalno menjaju, pa je njihov uspeh vrlo upitan. Prema nekim studijama, samo jedna trećina planiranih projekata organizacionih promena je uspešna (Jarrel, 2017). Nema razloga da se ne pretpostavi da se isto odnosi i na preduzetničke projekte u okviru korporativnog preduzetništva. I pored toga što je očigledno da je za uspešnu realizaciju projekata korporativnog preduzetništva potrebna sposobnost vođenja planiranih organizacionih promena na efikasan način, ova tema je do sada u oblasti korporativnog preduzetništva bila prilično zanemarena. Svi autori u oblasti korporativnog preduzetništva naglašavaju da ovaj napor vodi ka promenama ali niko nije ozbiljno istraživao problem sprovođenja tih promena. Tako je nastao ozbiljan jaz u oblasti korporativnog preduzetništva koji ovaj rad pokušava da zatvori. Integracija koncepta planiranih organizacionih promena u oblast korporativnog preduzetništva bi dala veoma korisne doprinose razvoju teorije i prakse korporativnog preduzetništva. Sa druge strane, svakako bi primena planiranih organizacionih promena u korporativnom preduzetništvu mogla da obogati i unapredi naša saznanja o tome kako treba sprovesti planirane organizacione promene.

Predmet istraživanja u ovom radu jeste upravljanje promenama tokom korporativnog preduzetništva. Osnovno istraživačko pitanje je: kako korporativni preduzetnici treba da sprovedu promene odnosno koje aktivnosti, metode i tehnike treba da preduzmu da bi efikasno sproveli promene kojima se realizuju njihovi preduzetnički poduhvati? Cilj rada je da predstavi

proces sprovođenja planiranih organizacionih promena tokom realizacije preduzetničkih poduhvata unutar kompanija. Osnovna hipoteza rada je sledeća:

H1: Uspešna realizacija poduhvata korporativnog preduzetništva u kompanijama zahteva primenu modela planiranih organizacionih promena.

Ova hipoteza će biti dokazana kroz integraciju modela korporativnog preduzetništva i modela upravljanja planiranim organizacionim promenama. Integracija će biti izvršena analizom relevantnih teorijskih koncepata kako korporativnog preduzetništva tako i planiranih organizacionih promena.

Rad je strukturiran na sledeći način. Prvo će korporativno preduzetništvo biti definisano i zatim objašnjene njegove osnovne dimenzije, komponente i procesi koje uključuje. Zatim će se izvršiti sinteza različitih modela planiranih organizacionih promena koji postoje u literaturi da bi se identifikovale aktivnosti, koraci ili faze planiranih organizacionih promena. Najzad, izvršiće se integrisanje modela planiranih organizacionih promena u korporativno preduzetništvo i to tako što će se opisati aktivnosti i faze planiranih organizacionih promena u toku procesa korporativnog preduzetništva.

KORPORATIVNO PREDUZETNIŠTVO

Korporativno preduzetništvo se odnosi na preduzetništvo unutar postojećih kompanija. Dakle, radi se o preduzetničkom ponašanju ne nezavisnog pojedinca, već člana organizacije, što značajno menja problem. Jedna od široko prihvaćenih definicija korporativnog preduzetništva sugerise da je ovo proces otkrivanja i razvoja novih mogućnosti za stvaranje vrednosti kroz inovaciju, bez obzira na resurse ili poziciju preduzetnika (Antončić & Hisrich, 2001). Takođe, neki autori definišu korporativno preduzetništvo kao proces kojim pojedinci unutar organizacije traže prilike u organizaciji i izvan nje i pokušavaju da ih iskoriste, bez obzira na resurse koji su im trenutno na raspolaganju (Lumpkin, 2007). Ove definicije naglašavaju spremnost pojedinca da

prihvati nove mogućnosti i preuzme odgovornost za kreativne promene. Korporativno preduzetništvo uključuje ponašanja koja se razlikuju od rutinske prakse i opisuje preduzetničko ponašanje zaposlenih unutar postojeće kompanije (Antončić & Hisrich, 2001).

Iako su koncept korporativnog preduzetništva razvijali mnogi istraživači, ne postoji konsenzus o njegovim uzrocima i procesima, tako da korporativno preduzetništvo ostaje „crna kutija“ (Glinyanova, Bouncken, Tiberius & Cuenca Ballester, 2021). Osim toga, istraživači su koristili različite termine za opisivanje preduzetničkih aktivnosti unutar organizacija, kao što su korporativno preduzetništvo (*corporate entrepreneurship*) (Kuratko *et al.*, 2014), intrapreduzetništvo (*intrapreneurship*) (Antončić & Hisrich, 2001) i korporativno ulaganje (*corporate venturing*) (Miles & Covin, 2002). Do sada su se istraživanja korporativnog preduzetništva uglavnom bavila definisanjem fenomena (Sharma & Chrisman, 2007), uticajem na performanse (Zahra & Covin, 1995), faktorima koji podstiču korporativno preduzetništvo i karakteristikama organizacije koja ga neguje (Burger & Blažková, 2020), ulogom menadžera kao facilitatora (Burgess, 2013; Cingula, 2013), merenjem korporativnog preduzetništva (Kuratko *et al.*, 2014) i uticajem drugih varijabli koje imaju indirektan ili posrednički uticaj na korporativno preduzetništvo (Lumpkin & Dess, 2001).

Važno pitanje u korporativnom preduzetništvu je njegov uticaj na performanse preduzeća. Generalno se smatra da preduzetništvo ima pozitivan efekat na performanse kompanije (Mokaya, 2012). Preduzetnička aktivnost dovodi do sticanja i zadržavanja konkurentске prednosti bez obzira na industriju i veličinu organizacije (Bhardwaj, Sushil & Momaya, 2011). „Preduzetničke akcije pomažu u održavanju konkurentске prednosti za firme koje se suočavaju sa brzim promenama u industriji, tržišnim strukturama, potrebama kupaca, tehnologiji i društvenim vrednostima“ (Bhardwaj *et al.*, 2011, str. 188). Takođe, povećava profitabilnost, dugoročni opstanak, rast i finansijsku stabilnost (Hitt, Ireland,

Camp & Sexton, 2001). Ipak, iako se preduzetništvo smatra pokretačkom snagom u stvaranju vrednosti na međunarodnom i nacionalnom tržištu, nema dovoljno empirijskih studija o povezanosti preduzetništva i performansi (Kahkha, Kahrazeah & Armesh, 2014).

Mnoge definicije korporativnog preduzetništva objašnjavaju ga kao deo procesa radikalne promene koja revitalizuje kompaniju (Glinyanova *et al.*, 2021). D. F. Kuratko, R. D. Ireland, J. G. Covin i J. S. Hornsby (2005) definišu korporativno preduzetništvo kao proces u kojem pojedinac ili grupa pojedinaca, u okviru postojeće kompanije, stvara novi biznis ili podstiče inovaciju u okviru postojećeg biznisa. Prema ovoj definiciji, strateška promena (transformacija organizacije koja uključuje velike strateške i/ili strukturne promene), inovacija (koja se bavi uvođenjem nečeg novog na tržište) i korporativni poduhvat (korporativni preduzetnički naponi koji dovode do stvaranja nove poslovne organizacije u okviru korporacije) su svi važni i legitimni delovi korporativnog preduzetničkog procesa. R. D. Ireland, J. G. Covin i D. F. Kuratko (2009) tvrde da korporativno preduzetništvo podržava stratešku obnovu kompanije, a samim tim i stvaranje novih biznisa uz istovremeno unapređenje postojećih. Ove definicije korporativnog preduzetništva uključuju: transformaciju stagnirajućih preduzeća u dinamične, mehanizme rekreiranja ekonomske sposobnosti, aktiviranje ili revitalizacija postojeće organizacije kroz preuzimanje rizika, inovacije i aktivno konkurentsko ponašanje (Zahra & Covin, 1995) ili podmlađivanje i revitalizaciju postojećih kompanija (Maes, 2003). G. G. Dess, R. D. Ireland, S. A. Zahra, S. W. Floyd, J. J. Janney i P. J. Lane (2003) navode četiri tipa korporativnog preduzetništva: održiva regeneracija, podmlađivanje organizacije, strateški oporavak i strateški zaokret. Te četiri kategorije uključuju većinu oblika korporativnog preduzetništva u organizacijama. Dakle, suština korporativnog preduzetništva je u uvođenju inovacija kroz promene u postojećim biznisima i organizacijama (Heinze & Weber, 2016). To znači da je sastavni deo procesa korporativnog preduzetništva ne samo kreiranje inovacija već i njihovo sprovođenje kroz planirane organizacione promene. Obzirom na to, iznenađujuće malo pažnje je do sada bilo posvećeno tom delu procesa

korporativnog preduzetništva. Čitav preduzetnički poduhvat unutar kompanije neće moći da bude realizovan i pored sjajnih ideja i inovacija ukoliko organizacija nema kapacitet za implementaciju tih inovacija kroz planirane organizacione promene.

Glavne aktivnosti vezane za korporativno preduzetništvo uključuju percepciju šansi, generisanje ideja, dizajniranje novog proizvoda ili druge rekombinacije resursa, izgradnju interne koalicije, ubeđivanje menadžmenta, nabavku resursa, planiranje i organizovanje (Burger & Blažková, 2020). Ključni bihevioralni aspekti internog preduzetništva su lična inicijativa, aktivno traženje informacija, razmišljanje izvan okvira („out of box“ thinking), formulisanje, zagovaranje, preuzimanje odgovornosti, pronalaženje rešenja i određeni stepen preuzimanja rizika (Lumpkin, 2007). D. F. Kuratko *et al* (2005) izneli su sledeće osnovne aktivnosti: podrška, usavršavanje i guranje preduzetničkih ideja kroz organizacionu birokratiju i individualne mreže, identifikovanje, sticanje i raspoređivanje resursa potrebnih za ostvarivanje ovih ideja. S. Shane i S. Venkataraman (2000) opisali su preduzetničku aktivnost kao otkrivanje, evaluaciju i iskorišćavanje mogućnosti. O. Belousova, B. Gailly i O. Basso (2009) uveli su još jednu aktivnost kao zasebnu kategoriju: legitimaciju ili uključivanje koja podrazumeva proces širenja ideje, njeno objašnjavanje članovima organizacije kao i njihovo uključivanje u mrežu projekta. Do sada identifikovane aktivnosti korporativnog preduzetništva nisu dovoljne da opišu sve ono što treba obaviti da bi se jedan preduzetnički poduhvat unutar postojeće organizacije realizovao. Autori su se do sada uglavnom fokusirali na kreiranje inovacija, ali ne i na njihovo sprovođenje. Da bi se realizovao preduzetnički poduhvat unutar kompanije potrebno je sprovesti planirane organizacione promene koje uključuju brojne aktivnosti. Te aktivnosti nisu do sada eksplicitno navođene u teorijama i modelima korporativnog preduzetništva. Stoga je potrebno identifikovati aktivnosti koje uključuju modeli planiranih organizacionih promena i zatim ih primeniti u kontekstu realizacije preduzetničkog poduhvata unutar kompanije.

PLANIRANE ORGANIZACIONE PROMENE

Poslujući u okolnostima globalizacije, tehnološkog razvoja, političkih promena i nepredviđenih događaja kao što su pandemije i rat, savremene kompanije su primorane na česte organizacione promene. Međutim, organizacione promene su skupe, rizične i povezane sa mnogim negativnim posledicama po organizaciju i njene članove. Stoga menadžment kompanije nastoji da ih sprovede brzo i efikasno pristupajući im na planski i promišljen način. Iz tog razloga su se u literaturi razvili mnogi modeli planiranih organizacionih promena koji imaju za cilj da pomognu menadžmentu u vođenju promena.

Planirane organizacione promene predstavljaju posebnu vrstu promena u organizacijama koje se odvijaju kao posledica svesnih, planiranih napora menadžmenta organizacije. One se razlikuju od spontanih organizacionih promena koje se dešavaju u svakoj organizaciji u svakom vremenskom trenutku, nezavisno od volje i intencija menadžmenta. Planirane organizacione promene mogu obuhvatiti vrlo različite promene po kriterijumu uzroka, sadržaja i vrste samih promena (Janićijević, 2008). Prema uzroku, promene mogu biti organizaciona adaptacija, promene prouzrokovane spoljnim faktorima koji nameću potrebu adaptiranja organizacije, sa jedne i organizacioni razvoj, internim faktorima prouzrokovne promene, sa druge strane (Maes & Hootegem, 2019). Sa aspekta sadržaja, planirane organizacione promene uključuju promene formalnih, tvrdih (hard) komponenti organizacije (strukture i sistemi), sa jedne i neformalnih, mekih (soft) komponenti organizacije (liderstvo, kultura, ljudski resursi), sa druge strane. Najzad, po kriterijumu vrste promena, planirane organizacione promene mogu uključiti kontinuelne promene (inkrementalne, parcijalne, evolutivne) i diskontinuelne promene (radikalne, sveobuhvatne, revolutivne) (Vrcelj, 2023). Planirane organizacione promene uvek vode pojedinac ili tim koji imaju ulogu agenta promena: nekoga ko operativno planira, vodi i kontroliše process promena (Janićijević, 2008).

Ključno pitanje u oblasti planiranih organizacionih promena jeste svakako proces promena odnosno

aktivnosti koje menadžment treba da obavi kako bi uspešno sproveo promene. Modeli planiranih organizacionih promena, koji su razvijeni u literaturi, međusobno se razlikuju upravo po koracima ili grupama aktivnosti koje treba preduzeti određenim redosledom da bi se uspešno sprovele planirane organizacione promene. U literaturi se mogu pronaći brojni modeli planiranih organizacionih promena (Siddiqui, 2017; Teczke, Bespayeva & Bugubayeva, 2017; Stouten *et al*, 2018; Rosenbaum, More & Steane, 2018; Maes & Hootegem, 2019; Vrcelj, 2023). Prema jednom od najboljih pregleda modela planiranih organizacionih promena (Stouten *et al*, 2018), najcitiraniji modeli u *Web of Science* i modeli koji se najviše pretražuju na Internetu su: 1. model u šest koraka (Beer, Eisenstat & Spector, 1996); 2. Kotterov model od osam koraka (Kotter, 1996); 3. Džadsonov petostepeni model (Judson, 1991); 4. model deset zapovesti (Kanter, Stein & Jick, 1992); 5. pozitivno istraživanje (Appreciative Inquiry) (Cooperrider & Srivastva, 1987); 6. ADKAR model (Hiatt, 2006). Dodali bismo i Nadlerov model dvanaest akcionih koraka (Nadler, 1997) i Model deset ključeva (Pendlebury, Grouard & Meston, 1998).

Čak i letimičan pregled ovih modela planiranih organizacionih promena implicira da su oni slični i da se u velikoj meri preklapaju. To je zato što su svi bazirani na istom, Levinovom (Lewin) modelu „odmrzavanje - kretanje - ponovno zamrzavanje“. K. Levin-ov ključni rad (Lewin, 1952) postavio je temelje za sva kasnija razmišljanja o tome kako bi trebalo da izgleda proces planiranih organizacionih promena. Relativna sličnost svih pomenutih modela planiranih organizacionih promena omogućava njihovu sintezu te smo zaključili da se sve aktivnosti koje menadžment treba da preduzme za sprovođenje planiranih organizacionih promena mogu grupisati u sedam velikih grupa koje predstavljaju i faze ili korake planiranih organizacionih promena: 1. stvaranje svesti o neophodnosti promena; 2. kreiranje i komuniciranje vizije; 3. priprema za promene; 4. implementacija promena; 5. olakšavanje (facilitating) promena; 6. institucionalizacija promena; i 7. monitoring promena. Ove grupe aktivnosti su hronološki poređane mada je moguće i njihovo preklapanje. Sve identifikovane grupe aktivnosti mogu se grupisati u tri osnovne

faze Levinovog procesa promena. Stvaranje svesti o neophodnosti promena, kreiranje i komuniciranje vizije, kao i priprema za promene pripadaju fazi odmrzavanja u Levinovom modelu. U Levinovoj fazi pokreta obavljaju se dve grupe aktivnosti: sprovođenje i olakšavanje promena. Najzad, Levinovo ponovno zamrzavanje uključuje dve grupe aktivnosti: institucionalizaciju promena i monitoring promena.

Prvi korak u planiranim organizacionim promenama jeste kreiranje svesti u organizaciji da su promene neophodne. Time se prekida inercija u organizaciji i stvaraju uslovi da promene uopšte započnu. Dobar broj autora pomenutih modela planiranih organizacionih promena su u svoje modele uključili neku od aktivnosti koja pripada ovoj grupi. J. P. Kotter (1996) eksplicitno naglašava važnost potrebe da se u organizaciji kreira i proširi svest da su promene ne samo potrebne već su i hitne. Slično je i u ADKAR modelu (Hiatt, 2006). Suština koraka jeste odvajanje od prošlosti (Kanter *et al*, 1992), što govori da ove aktivnosti treba da dovedu, pre svega, do promene na mentalnom planu, odnosno u svesti članova organizacije. Prema modelima planiranih organizacionih promena ova inicijalna aktivnost promena se odvija kroz analizu organizacionih problema i/ili percipiranjem mogućnosti i šansi koje zahtevaju promene (Stouten *et al*, 2018).

Drugi korak u okviru faze odmrzavanja jeste kreiranje i komuniciranje vizije. Nakon što je u prvom koraku postignuto razumevanje da su promene potrebne, u drugom koraku je potrebno oblikovati budućnost ka kojoj se teži, što će biti i cilj promena. U gotovo svim modelima nalazimo neke aktivnosti koje pripadaju ovoj grupi. Tako D. L. Cooperrider i S. Srivastva (1987), M. Beer *et al* (1990), J. P. Kotter (1996), J. Pendlebury *et al* (1998), J. M. Hiatt (2006), kao i J. Stouten *et al* (2018) eksplicitno navode da je u ovom koraku potrebno ne samo oblikovati jasnu i uverljivu viziju već i da je neophodno komunicirati je kroz organizaciju. Ovaj drugi deo koji se odnosi na širenje vizije je kritičan budući da, ukoliko vizija ostane u glavi lidera ili top menadžera, promene neće uspeti.

Treći korak u fazi odmrzavanja jeste priprema za promene i sastoji se od četiri osnovna zadatka

koje treba da izvede agent promena. Prvi zadatak podrazumeva planiranje promena i postavljanje strukture koja je potrebna da se promene izvedu, čime se otklanjaju prepreke promenama (Judson, 1991; Kanter *et al*, 1992; Kotter, 1996). Zatim je neophodno obezbediti političku podršku za promene ne samo od lidera, već i od svih onih koji imaju moć u organizaciji. Većina modela planiranih organizacionih promena sadrži aktivnosti kojima se upravlja moći jer je moć aktivan i pasivan učesnik promena (Kanter *et al*, 1992; Kotter, 1996; Nadler, 1997; Pendlebury *et al*, 1998; Stouten *et al*, 2018). Moć je aktivan činilac promena, jer agent promena mora imati moć da sprovede promene a pasivan jer oni koji imaju moć u organizaciji mogu olakšati ali i blokirati promene. Sledeći zadatak u okviru pripreme promena jeste motivisanje na promene kako bi se obezbedila dovoljna energija za njihovu realizaciju (Pendlebury *et al*, 1998; Hiatt, 2006; Stouten *et al*, 2018). Najzad, nije dovoljno samo motivisati članove organizacije na promene već je neophodno obezbediti da oni imaju dovoljno znanja i sposobnosti da se promene izvedu (Hiatt, 2006; Stouten *et al*, 2018).

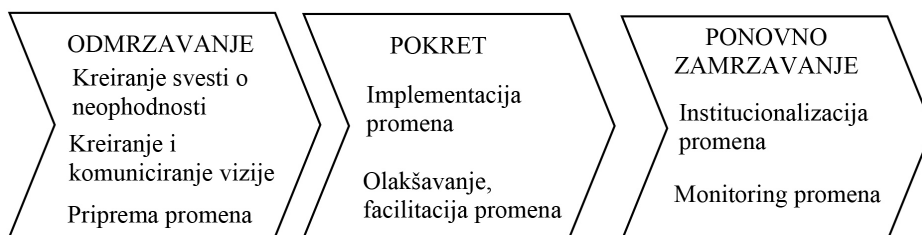
Druga faza procesa promena prema Levinu, faza pokreta, jeste ona u kojoj se promene izvršavaju. Ona obuhvata dve grupe aktivnosti prema citiranim modelima planiranih organizacionih promena. Prva je implementacija promena i obuhvata neposredne aktivnosti kojima se operacionalizuju promene. Svi izabrani modeli planiranih organizacionih promena sadrže neki oblik ove aktivnosti. One se sastoje u operativnom planiranju promena i njihovom sprovođenju. Uz njih J. P. Kotter (1996) dodaje i ostvarivanje brzih početnih uspeha i dalje

osnaživanje promena na bazi tih uspeha. Druga grupa aktivnosti u fazi pokreta podrazumeva da se tokom implementacije vrši i olakšavanje (facilitating) promena, što uključuje komunikaciju promena, praćenje i jačanje procesa promena (Kanter *et al*, 1992; Nadler, 1997; Stouten *et al*, 2018).

U trećoj Levinovoj fazi procesa promena, ponovno zamrzavanje (refreezing), organizacija se prole sprovedenih promena stabilizuje i to kroz dve grupe aktivnosti. Institucionalizacija promena podrazumeva njihovo uključivanje u kulturu organizacije kako bi se obezbedila održivost promena. Ove aktivnosti sadrže svi navedeni modeli planiranih organizacionih promena. Osim toga, na samom kraju procesa potrebno je izvršiti monitoring i kontrolu obavljenih promena čime se one dodatno ojačavaju (Beer *et al*, 1990; Judson, 1991; Kanter *et al*, 1992; Nadler 1997).

INTEGRISANJE PLANIRANIH ORGANIZACIONIH PROMENA U KORPORATIVNO PREDUZETNIŠTVO

Korporativno preduzetništvo podrazumeva iniciranje i realizaciju preduzetničkog poduhvata unutar postojeće organizacije kojim se inoviraju proizvodi, procesi, tržišni nastup i organizacija. Iz tog razloga, planirane organizacione promene moraju biti sastavni deo procesa korporativnog preduzetništva. Razumevanje korporativnog preduzetništva nije potpuno ako ne uključuje, pored izvora i efekata inovacija, i procese putem kojih se one realizuju kroz



Slika 1 Proces planiranih organizacionih promena

Izvor: Autorova sinteza na osnovu izabranih modela planiranih organizacionih promena

preduzetnički poduhvat unutar organizacije (Güven, 2020). Mišljenja smo da bi saznanja do kojih su došli istraživači organizacionih promena mogla da budu veoma korisna na teorijskom i praktičnom nivou u oblasti korporativnog preduzetništva. Aktivnosti, koraci i faze planiranih organizacionih promena treba da budu posmatrane kao deo procesa korporativnog preduzetništva. Takođe, ove aktivnosti i koraci treba da budu praktično uputstvo internim preduzetnicima kako da realizuju u praksi svoje preduzetničke ideje. Interni preduzetnici, kao pojedinci ili grupe, moraju se posmatrati kao agenti promena koji treba da proces preduzetničkih inovacija sprovedu, kao i svake promene, što efikasnije. Da bi to mogli, korisno je da budu upoznati sa osnovnim aktivnostima planiranih organizacionih promena identifikovanim u odgovarajućim modelima.

Prethodna sinteza aktivnosti, koraka i faza procesa planiranih organizacionih promena je korisna osnova za proširivanje teorije i prakse korporativnog preduzetništva. Pri tome, moraju se uzeti u obzir specifičnost promena koje se realizuju u korporativnom preduzetništvu i prilagoditi mu aktivnosti planiranih organizacionih promena.

Kreiranje i komuniciranje vizije je uobičajeno druga aktivnost odnosno drugi korak u procesu planiranih organizacionih promena (Phillips & Klein, 2023). Međutim, proces realizacije preduzetničke inovacije startuje upravo od kreiranja vizije te je u slučaju sprovođenja promena u korporativnom preduzetništvu to ipak prva aktivnost. Interni preduzetnik kreira viziju kroz svoju inovaciju biznisa koju osmišljava i predlaže. Vrlo je važno da ta vizija bude jasna i razumljiva svima u organizaciji. Zato treba da bude formulisana na način i jezikom koji mogu razumeti svi ili većina u kompaniji. Vizija mora biti poželjna i atraktivna, ali i realna tako da bude percipirana kao izvodljiva. Interni preduzetnik kao agent promena mora da na neki način formalizuje svoju viziju, najverovatnije, kroz formalni predlog preduzetničkog projekta koji će ponuditi rukovodstvu kompanije. Takođe, komuniciranje vizije stavlja pred internog preduzetnika zadatak da se posveti aktivnoj komunikaciji sa svim članovima organizacije, ne

samo sa menadžmentom. Komuniciranje vizije mora ići ne samo vertikalnim već i horizontalnim kanalima. Pri tome, važi pravilo „što više to bolje“ koje podrazumeva da je potrebno dati što je moguće više informacija o viziji, na što više načina i na što više mesta. Treba koristiti sve raspoložive kanale komuniciranja. U komuniciranju vizije interni preduzetnik treba da koristi princip ponavljanja odnosno da ponavlja više puta istu informaciju. U komuniciranju vizije interni preduzetnik treba da koristi metafore, analogije i slično.

Kreiranje svesti o neophodnosti promena može biti veoma izazovna aktivnost za internog preduzetnika kao agenta promena (Jančićević, 2008; McFee, 2023). Kada se promene uvode u organizaciju koja je u krizi, prilično je lako kreirati svest o neophodnosti promena. U tom slučaju, pojavni znaci krize kao što je, na primer, pad performansi, gubitak resursa ili štrajkovi čine da članovi organizacije brzo postanu svesni neophodnosti promena. Međutim, korporativno preduzetništvo podrazumeva promene koje najčešće nisu proizorokovane krizom, padom performansi ili problemima u funkcionisanju organizacije. Te promene su izazvane preduzetničkom inicijativnom i idejama kako unaprediti poslovanje i performanse organizacije koja je inače uspešna. Utoliko je to teži zadatak za internog preduzetnika kao agenta promena. On se može obaviti tako što će se ova aktivnost sprovođenja promena stopiti sa prethodnom i nastaviti na nju odnosno tako što će se komunicirati neophodnost realizacije vizije. Budući da se ne može osloniti na pretnju krizom i propašću kompanije, interni preduzetnik mora da jača svest o neophodnosti promena u kompaniji koristeći argumente prednosti koje će imati realizacija njegove vizije. Dakle, posle kreiranja vizije, u toku njenog komuniciranja zaposlenima i menadžerima, potrebno je naglašavati neophodnost korišćenja šansi koje pruža realizacija vizije i pretnji ako se ta vizija ne realizuje. Stoga, proces komuniciranja vizije mora da ima za cilj ne samo upoznavanje zaposlenih i menadžera sa preduzetničkom inovacijom već i sa razlozima zašto je neophodna njena realizacija, te kakve šanse kompanija propušta ako je ne realizuje.

Priprema promena bi za internog preduzetnika trebalo da počne obezbeđivanjem političke podrške za svoje vizije i inovacije (Kotter, 1996; Phillips & Klein, 2023). Neophodno je da dobije podršku lidera, ali i svih drugih moćnih grupa unutar organizacije. Ukoliko to ne uspe, preduzetnički projekat se neće realizovati. Obezbeđenje da top menadžment i moćne grupe unutar organizacije prihvate preduzetnički projekat bi trebalo preduzetničku ideju da pretvori u zvanično odobren preduzetnički projekat, a internog preduzetnika u agenta promena koji ima dovoljno moći da sprovede promene kojima se realizuje prihvaćeni projekat. Ova aktivnost podrazumeva političke aktivnosti kroz korišćenje moći i uticaja internog preduzetnika i zahteva od internog preduzetnika određene političke sposobnosti i veštine. Interni preduzetnik kao agent promena mora imati sposobnost da ostvari uticaj u sva tri pravca: naniže ka podređenima na nižim hijerarhijskim nivoima, horizontalno ka saradnicima na istom hijerarhijskom nivou i naviše ka rukovodiocima na višim hijerarhijskim nivoima. Jedino tako on može obezbediti prihvatanje njegovog preduzetničkog poduhvata u celoj organizaciji. Pored podrške i prihvatanja, interni preduzetnici treba da obezbede i motivaciju zaposlenih i menadžera da učestvuju u realizaciji preduzetničke inovacije (Güven, 2020). Motivisanje zaposlenih i menadžera da prihvate promene se može sprovesti na dva načina: razvojem nezadovoljstva postojećim stanjem kompanije (štap) i razvojem pozitivnih očekivanja od promena (šargarepa). Interni preduzetnik treba da se fokusira na ovaj drugi metod motivisanja budući da, osim ako je kompanija u krizi, nije realno da može postići motivaciju prvim metodom. Kao i u prethodne dve aktivnosti, da bi motivisao kolege da prihvate promene i uključe se u njih, interni preduzetnik mora intenzivno da komunicira kroz čitavu organizaciju. Poslednji zadatak u ovoj grupi aktivnosti jeste izgradnja znanja i sposobnosti zaposlenih i menadžera potrebnih da se inovacije realizuju (Phillips & Klein, 2023). To je veoma težak zadatak za internog preduzetnika budući da on nema formalni autoritet nad procesom razvoja ljudskih resursa. Stoga može samo primerom delovati na ostale menadžere i zaposlene u kompaniji.

Kada dođe do realizacije preduzetničkog poduhvata interni preduzetnik, kao agent promena, mora da preuzima aktivnosti operativnog sprovođenja (implementacije) promena (McFee, 2023). On mora da obavlja ulogu vođe projekta i da obavlja sve aktivnosti koje ta uloga podrazumeva. Operacionalizacija inovacionog projekta zahteva operativno planiranje i pripremu, kao i izvođenje tokom koga interni preduzetnik prati, usmerava i kontroliše aktivnosti svih članova projektnog tima (Pendlebury *et al*, 1998). Ukoliko su promene, koje implicira realizacija preduzetničke inovacije, široke i radikalne, vrlo je verovatno da će njihovo sprovođenje zahtevati osnivanje i rad više projektnih timova. Interni preduzetnik bi morao u tom slučaju da obavlja aktivnosti koordinacije rada više projektnih timova kao i praćenje i kontrolu njihovog rada. Obim angažovnja internog preduzetnika kao agenta promena u ovoj fazi zavisi od širine i dubine promena koje realizacija njegovog poduhvata zahteva. Izazov za internog preduzetnika mogao bi biti autoritet koji mu je potreban da bi efikasno vodio i koordinirao rad operativnih timova za sprovođenje promena. Zato je neophodno da se u prethodnoj fazi obezbedi u potpunosti podrška top menadžmenta organizacije.

Tokom sprovođenja promena neophodno je da agent promena deluje kao facilitator promena (Güven, 2020). Ta uloga podrazumeva tri osnovna zadatka. Prvo, interni preduzetnik mora da prati realizaciju sprovođenja promena i da u svakom trenutku ima informaciju o stanju projekta. Drugo, interni preduzetnik u ulozi agenta promena mora da otklanja teškoće i osnažuje učesnike u sprovođenju njegovog preduzetničkog poduhvata. Drugim rečima, on mora da rešava probleme koji iskrsavaju tokom sprovođenja promena. Treće, interni preduzetnik mora da komunicira promene tokom njihovog sprovođenja. On mora da komunicira tok promena, ostvarene efekte promena, kao i očekivanja u pogledu roka i krajnjeg rezultata. Komuniciranje je usmereno kako na top menadžment kao glavog sponzora projekta, tako i na sve zaposlene i menadžere u preduzeću. Takođe, interni preduzetnik treba da, u saradnji sa top menadžmentom, obezbedi plasiranje informacija o preduzetničkom poduhvatu zainteresovanoj eksternoj javnosti.

Institucionalizacijom promena započinje proces njihove konsolidacije ili ponovnog zamrzavanja (Janićijević, 2008). Da bi promene realizovane preduzetničkom inovacijom bile održive, one moraju biti usklađene sa organizacionom kulturom kompanije. Kultura kao set pretpostavki, vrednosti, normi i stvova koje dele članovi organizacije, u značajnoj meri oblikuje njihovo mišljenje i ponašanje (Janićijević, 2013). Ukoliko se realizacijom preduzetničke inovacije uvedu takve novine u poslovanje kompanije koje traže od zaposlenih i menadžera da rade na način koji je u neskladu sa njihovim postojećim vrednostima i normama, oni će ući u stanje kognitivne disonance. To je vrlo neprijatno i frustrirajuće stanje iz koga zaposleni i menadžeri nastoje da izađu tako što će se vratiti svom uobičajenom načinu rada koji je u skladu sa njihovim stavovima i vrednostima. Ukoliko se to desi, promene koje su uvedene će biti napuštene, odnosno biće samo formalne a ne suštinske. Da se to ne bi desilo, interni preduzetnik kao agent promena mora da proveri da li se preduzetnička inovacija kosi sa vladajućim kulturnim vrednostima i da, ako je takav slučaj, pristupi promeni organizacione kulture da bi se ona uskladila sa novim modelom poslovanja. Time se vrši institucionalizacija promena odnosno njena ugradnja u kulturu organizacije. Taj zadatak predstavlja značajan izazov za internog preduzetnika budući da je proces promene kulture veoma kompleksan, dug i zahtevan (Janićijević, 2013). U njemu je potrebno angažovanje velike količine moći i aktivna uloga lidera. Interni preduzetnik, sam po sebi, nema kapacitete da menja organizacionu kulturu kako bi u nju uključio novine koje donosi preduzetnički projekat. Stoga, da bi obavio ovu aktivnost, mora da obezbedi podršku, pa i učešće lidera organizacije.

Monitoring promena je poslednja aktivnost u procesu realizacije preduzetnikog poduhvata. Interni preduzetnik treba da prati realizaciju projekta i, na njegovom kraju, da analizira izvršene promene i da kontroliše njihove efekte. On treba da obezbedi da se iskustva realizacije projekta ugrade u organizaciono znanje za budućnost. Takođe, interni preduzetnik treba, na osnovu stečenih iskustava, osveži projekat ili čak da započne novi ciklus promena ukoliko monitoring pokaže da je to neophodno.

ZAKLJUČAK

Korporativno preduzetništvo podrazumeva inovativne, proaktivne i transformacione promene kompanije koje su rezultat preduzetništva pojedinaca i grupa unutar same kompanije. Pojedinci i grupe unutar organizacije, kao interni preduzetnici kreiraju inovacije kojima se menja način na koji kompanija isporučuje vrednost potrošačima. Krajnji efekat korporativnog preduzetništva je kreiranje novih biznisa u okvirima postojeće kompanije i/ili revitalizacija i regeneracija njenih postojećih biznisa.

S obzirom na činjenicu da se korporativno preduzetništvo zapravo realizuje kroz inovativne promene postojećih ili kreiranje novih biznisa unutar kompanije, neophodno je u koncept korporativnog preduzetništva uključiti saznanja do kojih su do sada došli istraživači planiranih organizacionih promena. Iz modela planiranih organizacionih promena potrebno je u koncept korporativnog preduzetništva uneti korake odnosno aktivnosti koje interni preduzetnik treba da preduzme da bi mogao da realizuje svoju preduzetničku inicijativu.

Identifikovanje aktivnosti ili koraka koje interni preduzetnici treba da preduzmu kako bi uspešno sprovedli promene i tako realizovali svoje preduzetničke poduhvate predstavlja najvažniji rezultat istraživanja prezentiranog u ovom radu. Te aktivnosti odnosno koraci ili faze planiranih organizacionih promena moraju biti sastavni deo procesa korporativnog preduzetništva kako bi ono bilo postavljeno na realnim osnovama i moglo da ostvari svoje efekte. Grupe aktivnosti, koraci ili faze procesa promena, kao sastavne komponente korporativnog preduzetništva, su: 1. kreiranje i komuniciranje vizije; 2. kreiranje svesti o neophodnosti promena; 3. priprema promena; 4. implementacija promena; 5. olakšavanje (facilitacija) promena; 6. institucionalizacija promena; i 7. monitoring promena. Identifikovanjem navedenih aktivnosti upravljanja promenama koje je neophodno preduzeti u procesu realizacije projekata korporativnog preduzetništva dokazana je osnovna hipoteza u ovom istraživanju.

Ključan teorijski doprinos rada ogleda se u dokazivanju potrebe da se teorija korporativnog

preduzetništva proširi istraživanjima organizacionih promena kao legitimnog elementa preduzetničkog procesa unutar postojećih organizacija. Ovo je vrlo obećavajući pravac istraživanja koji može doprineti ne samo razvoju koncepta korporativnog preduzetništva već i razvoju teorije organizacionih promena. Ključni aplikativni doprinos rada sastoji se u uputstvu menadžmentu kompanija i internim preduzetnicima kako da efikasno vode proces organizacionih promena tokom realizacije preduzetničkih projekata. Pored ovih doprinosa, rad otvara i neka pitanja relevantna za buduća istraživanja. Pre svega, budućim istraživanjima treba produbiti saznanja o metodima i tehnikama sprovođenja identifikovanih aktivnosti u procesu upravljanja promenama. Takođe, potrebno je istražiti uticaj relevantnih organizacionih varijabli na proces upravljanja promenama tokom korporativnog preduzetništva, kao što su: organizaciona kultura i liderstvo.

Ključna ograničenja prezentiranih istraživanja su sledeća. Istraživanje je teorijske prirode i nedostaje mu empirijska potvrda. Zatim, u istraživanju se nije pravila razlika između internog i korporativnog preduzetništva koja, prema nekim autorima, postoji. Najzad, korišćena je samo jedna, doduše vrlo kredibilna, klasifikacija modela planiranih organizacionih promena. Da je korišćena neka druga klasifikacija moguće je da bi rezultati bili drugačiji.

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THE ROLE OF PLANNED ORGANIZATIONAL CHANGE IN CORPORATE ENTREPRENEURSHIP

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In this paper, the corporate entrepreneurship concept is complemented by the contributions from planned organizational change models. Resulting from entrepreneurial endeavors undertaken by both individuals and groups within established organizations, corporate entrepreneurship leads to innovation or the regeneration of the existing and the creation of new businesses within the existing companies. However, there is little research in the change process through which entrepreneurial endeavors are realized. This paper seeks to close this gap by synthesizing the contributions of the most cited planned organizational change models, resulting in the activities or steps that, as the change agent, the internal entrepreneur should undertake in order to implement a corporate entrepreneurship project. Based on Lewin's model (unfreezing - move - refreezing), these activities include creating the awareness of the necessity of change, creating and communicating a vision, preparing for changes, implementing changes, facilitating changes, the institutionalizing and monitoring of changes. Thereby, the corporate entrepreneurship concept is complemented and made more realistic in practice.

Keywords: corporate entrepreneurship, planned organizational change, internal entrepreneur, organizational change process

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